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# PROCEEDINGS

OF A

# CONVENTION OF DELEGATES

FROM

# AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS

HELD AT

THE DEPARTMENT OF AGRICULTURE,

JULY 8 AND 9, 1885.

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# PROCEEDINGS OF THE CONVENTION.

On May 6, 1885, the Commissioner of Agriculture issued the following circular:

UNITED STATES DEPARTMENT OF AGRICULTURE,
*Washington, D. C., May 6, 1885.*

SIR: Recognizing the importance of a closer and more intimate association of the different agricultural colleges and other industrial and educational institutions with the Department over which I have been called to preside, I have concluded to call a convention of representatives of the different agricultural colleges and allied State institutions.

There are many ways in which the Department and the industrial colleges can co-operate to their mutual benefit, and such a convention, it seems to me, cannot fail to be productive of great good. The question of familiarizing our people, as a whole, with some of the fundamental truths of agriculture by teaching these in the public schools; the question of agricultural experiment stations, and the relation they should hold to this Department; the best means of bringing about Congressional action, and of harmonizing the interests of the different State institutions and the National Department, and many other cognate questions will suggest themselves. The value of experiments in agriculture is due largely to the uniformity of methods by which they are made, and it is believed that by the comparison of methods which such a convention will permit, much can be done to simplify and unify the processes now in use.

Much valuable time and a great deal of money are now lost in desultory and unmethodical experiments, which, by concerted action among the various stations and colleges of the country, could be made productive of great good.

As a practical illustration of what might be done in a very simple way by concerted action, such as I have mentioned, I will call attention to the immense losses which are now annually suffered by the planting of impure or imperfect seed, or by the planting of varieties in localities to which they are not adapted. If a system of co-operation between the seed division of the Department and the various agricultural stations and colleges of the United States could be agreed upon, looking to a general supervision of the seed of the country, it would doubtless receive the sanction of Congress and prove of great benefit. This is only one of the many ways in which immediate advantage to the farming interest could be secured.

I suggest, therefore, that each agricultural college or experiment station send one or more delegates to attend this meeting. I shall also be gratified to receive from you any suggestions concerning the subjects to be discussed or the title and name of author of any paper to be brought before the convention.

The convention will assemble in the Department building at Washington on the 24th of June next at 10 o'clock a. m.

Please let me hear from you at your earliest convenience.

Respectfully,

NORMAN J. COLMAN,
*Commissioner.*

Subsequently the date of the call was changed to July 8, 1885, and the convention met accordingly at the Department of Agriculture and was called to order at 10.30 on the morning of that day by Col. William F. Switzler. He said:

"GENTLEMEN OF THE CONVENTION: I move that this body be temporarily organized by calling Commissioner Colman to the chair.

A DELEGATE. I second the motion.

Mr. SWITZLER. It is moved and seconded that Commissioner Colman be elected temporary chairman of this convention. Are there any other nominations? There being no other, those of you who are in favor of the election of Commissioner Colman will signify it by saying "aye."

The response was unanimous, and Hon. Norman J. Colman, Commissioner of Agriculture, being declared elected, took the chair.

Delegate HENSHALL. I move you, sir, in order to make this organization permanent, that Mr. George T. Fairchild, of Kansas, be the temporary secretary of this organization.

The motion was agreed to.

Mr. FAIRCHILD. I move you that a committee of five be appointed by the chair to report as early as it is possible upon credentials of applicants for places in this convention.

This motion was also agreed to.

The CHAIRMAN. The chair will appoint as that committee Messrs. Fairchild, Townsend, Chamberlin, Sturtevant and Peabody. Mr. Fairchild having the roll of those who met last night, and I suppose the credentials, perhaps will be able to report immediately after the address of the Commissioner.

A delegate arose to address the chair.

The CHAIRMAN. I would make one request—I hope I will not be compelled often to repeat it—and that is, that gentlemen will announce their names and the States they hail from, so that the reporters will get their addresses. Of course you have come together here from all parts of the country and I am not acquainted with all of you personally, and you will do me a great favor, and especially a great favor to the reporters, if you will, on rising to address the convention, announce your names.

Mr. LAZENBY. I desire, Mr. Chairman, to offer the following resolution:

*Resolved*, That all persons officially connected with any institution, society, board, or bureau or experiment station whose purpose is the promotion of agricultural education or the dissemination of information on these subjects, and all persons representing institutions, societies, &c., by proxy of delegates, be entitled to the privileges of this convention.

The resolution was adopted.

Mr. FAIRCHILD. It may be well for the body to understand what information the committee has with reference to delegates, so that others whose names are not now on the roll may see that their names are presented. With permission of the chair, I will read the list of the names now in my hands.

The secretary here read the list of names. It appears hereafter.

The CHAIRMAN. I suppose it would expedite business if those whose names have not been announced would rise in their seats and state their names and the States from whence they come, and the colleges with which they are connected. If there is no objection that business will now be in order.

Mr. ATHERTON, of Pennsylvania. I would beg to suggest as a means of saving time, whether it would not be well to request those whose names are not on the list to hand in such credentials as they have, or that they simply make a statement of the conditions, and then let the secretary report at the end of this meeting.

The CHAIRMAN. I was about to suggest that.

Mr. ATHERTON. I make that as a motion.

The motion was agreed to.

Mr. FAIRCHILD. I will ask the committee on credentials to retire before the close of the address, if possible, that we may report immediately after the address on the credentials.

The CHAIRMAN. The committee will have an opportunity to retire if it sees proper; there are plenty of rooms just outside, or in the rear here.

Mr. FAIRCHILD. I will call the committee then by a signal, during the address, that we may retire and consider such credentials as may be before us.

Hon. Norman J. Colman, Commissioner of Agriculture, then made the following opening address to the convention:

*Gentlemen of the Agricultural College Convention:*

It was not without considerable hesitation that I assumed the responsibility of issuing a call for this convention. I thought I saw the necessity of the friends of agricultural colleges meeting together to take a reckoning, like the mariners at sea, as to their course and bearings, to ascertain whether they were satisfied with the progress that had been made, and whether the haven of their hopes and expectations was likely to be reached. If, upon consultation, the journey thus far has been satisfactory there is no need of a change of course, but if, on the contrary, the progress has been slow and tedious, and has not come up to the reasonable expectations of its friends or the general public, anchor should be cast, a consultation had, the difficulties ascertained, and a new programme agreed upon.

But to drop the figure of nautical speech, I took the responsibility of issuing a call for this convention, believing there was an urgent necessity for it. To those who have responded to it, and have come from their distant college homes, and to all who are present, manifesting an interest in the cause of agricultural education, I extend not only my thanks for their attendance but a most cordial welcome.

It is not necessary for me to recur to the discussions that took place in Congress to secure the magnificent land grants to endow agricultural colleges in the respective States of this Union, or to revive the memory of the high expectations that were raised in regard to the important work they would perform in preparing young men for agricultural pursuits, and in maintaining in a healthful and growing condition the agricultural interests of our country.

It will be conceded that the general public profess a degree of disappointment in the outcome of these institutions. Although their proper title is that of agricultural and mechanical colleges, they are popularly alluded to as agricultural only; therefore the logical inference is that their duties are mainly directed to the special subject of agricultural education, teaching the science and art of farming and showing the practical application of scientific investigations in the raising of crops.

## OBJECTS OF THE ENDOWMENTS.

The endowments granted by Congress for the support of these institutions were made for the purpose of educating young men as farmers, and also for instructing them in various mechanical pursuits. The predominant idea, however, was that of instructing young men in farming operations and in the fundamental principles of plant culture, so that they would learn how to realize profits in raising crops without diminishing the fertility of the soil. The arguments which influenced Congress to pass the land grants for the benefit of agricultural colleges were largely based upon submitted facts showing that the average yields of farming lands were gradually diminishing in quantity, and that the soil was rapidly being exhausted of plant food.

To arrest this somewhat alarming tendency towards spoliation of arable lands, it was deemed advisable to encourage institutions where the results of scientific investigations in vegetable physiology would be exemplified, and their practical application in fields and gardens so clearly illustrated to all who could happily avail themselves of this education that students would see it clearly demonstrated that the profits of farming were sufficiently great to direct more of the active energies of young men to the cultivation of the soil.

These were the intentions, but it is needless to observe that the results have not been commensurate with public expectations. Complaints have been made that comparatively few of the graduates from these colleges become farmers, that they adopt other professions, and that in some cases they have avoided rather than embraced the cultivation of farms as a vocation.

Without fully indorsing these views, we cannot ignore their existence, and to some extent admit their truth. Especially in cases where the maintenance of the farm is noted as a tax upon the funds of the college, it is not surprising that graduates should avoid a calling which has been demonstrated to them as unprofitable. I do not wish to dwell on this point, or to be understood as entertaining the belief that these remarks are applicable to all agricultural colleges at the present time, although it may have been a reasonable deduction in the earlier history of many of them, and may still be applicable to some. Be that as it may, I feel assured that we concur in the wish that all laudable means may be brought to their assistance which may advance their interests and enable them to realize the expectations of their founders.

## ACQUIRING AGRICULTURAL KNOWLEDGE.

The first step in the acquisition of knowledge is a desire to know. Fortunately this desire is strongly impressed upon the minds of the race, and this natural aspiration has only to be encouraged, enticed by that which is pleasant and attractive and brought in connection with that which is proposed to be studied, and an interest in learning will be awakened as a natural consequence.

For instance: If every college farm had an ample fruit garden where varieties of the best strawberries, raspberries, and other small fruits were grown, all properly labeled so that the peculiarities of each would be exhibited, attention would be directed to the culture and value of these fruits. A small vineyard should also be made for a like purpose. Orchards of apples, pears, plums, cherries, &c., should be planted where they could be visited by students, so that they might familiarize themselves with the different varieties, and observe the methods of culture, pruning, &c., and at the same time receive instruction as to the reasons for particular manipulations at certain periods. The fruits as they mature should appear on their tables for consumption, so that the value of the different kinds could be practically and intelligently discussed. No one can doubt the usefulness of all this as presenting educational advantages of the most practical character.

### TEACHING PRACTICAL FORESTRY.

Then again, forestry, so far as regards the details in the raising and management of forest trees, might well receive special attention from every agricultural college in the country. All operations connected with the culture of forest trees could be practiced and demonstrated, from the preparation of the ground, the sowing of the seeds, showing the proper depth of covering them, the time and method of transplanting, the necessary culture, the cutting down crooked or unsightly growing plants in order to produce straight and vigorous stems, pruning branches so as to maintain the kind of growth required, and other features of tree-culture would form one of the most useful as it would be one of the most attractive factors of an educational institution; and this would be a matter of easy accomplishment, as easy in fact as that of sowing a crop of peas or producing a crop of corn. Neither would it greatly absorb either labor or land, although it might be well that the final plantings should be at the yearly rate of only an acre in extent.

For educational purposes it is essential that seeds of various trees should be sown annually. In due time the young plants will be transferred from the seed rows, some to nurseries, others to take their place at once in the young forest, which is to be of yearly extension, so as to illustrate to every new-comer the entire process of tree-culture from seed-growing upward.

The arrangement in final planting will provide for the gradual thinning out of the more rapid-growing species; these, it will be explained, are introduced to hasten the development of slow-growing kinds, and when the time comes for their removal it will be shown how these rapid-growing trees can be utilized for various manufacturing purposes.

In the course of a few years, after several acres have thus been planted, illustrating the annual rate of growth of each kind of tree, and presenting unequaled facilities for instruction in all the phases of tree-culture, such a series of forest growth would attract attention from far beyond the locality of the grounds so occupied.

It need not be considered out of place to note that as an investment this culture of timber would pay as well in many localities as any other crop that could be produced on the same quantity of land. Then, again, while practical forestry will be fully exhibited, opportunities will be presented for the increase of knowledge about trees. Among other matters about which but little is known, it may be mentioned that the period of growth when wood is of maximum value is an unanswered question.

### AN ARBORETUM ON COLLEGE FARMS.

On every college farm a commencement should be made of planting an arboretum, which should ultimately contain at least one specimen plant of every tree and shrub capable of enduring the climate of the locality; trees from all parts of the world to be included, arranged in family groups, and accurately and conspicuously labeled. This systematic arrangement should be combined with the highest degree of adaptation to landscape effect and pleasure-ground adornment.

The utility of an arboretum is as obvious and important as that of any other museum of natural history. Unlike most other museum collections, this would constantly vary in its beauty and attractions—the annual development of individual growths, with all their wonderful combinations of forms, foliage, flowers, and fruits. The opening buds in spring and the varied hues of the foliage during autumn represent extreme periods, between which each day has its own peculiar attractions, affording a field of instruction which will largely tend to increase the desire to acquire knowledge of vegetable physiology, and furnish strong incentives to the pursuit of botanical studies.

### HEDGES OR LIVE FENCES.

Practical instructions in planting and rearing live fences would, perhaps, lead to a better knowledge of the necessity of systematic management in order to maintain a good, useful hedge. Many losses have occurred and many dollars have been squandered in first planting a hedge and then neglecting it. The uses of hedges have not been exhausted, and a knowledge of how to produce them, and keep them in proper condition afterwards, would lead to their frequent introduction, more especially as ornamental adjuncts to rural embellishments, and for the shelter and protection they afford to fruits and vegetables. In this line experiments may profitably be made as to the best hedge plants for various sections of the country, different climates naturally suggesting different plants for this purpose.

### EXPERIMENTAL WORK ON COLLEGE FARMS.

In conducting farming operations on college lands the idea has been entertained that the work should mainly be of an experimental character. While experiments, if fairly conducted, are always of some value, even when they teach us what to avoid, yet they should be considered as being distinct from the principal farm work, which should consist of the application of methods which are recognized as being essential to successful and profitable farming, so that the records of the cost and value of productions will show that farming is a profitable industry.

No opportunity, however, should be lost in introducing examples of processes known to be valuable, even if not generally adopted.

Underground draining, for instance, is a fundamental improvement in certain soils, and, wherever it is practicable to make the comparison, the benefits of underdraining should be shown; the best methods of performing the work; the respective merits of deep and shallow draining; the gradual amelioration of soils thus operated upon, and its effects on crops in regard to their early maturity and increased productiveness as contrasted with soils of similar quality similarly treated and similarly situated, but which have not been drained. In farming, if in nothing else, example is more valuable than precept. In the fields ocular demonstration is at once the most silent and the most effective teacher.

These suggestions refer more particularly to matters which may be regarded as permanent accompaniments to every college farm, and so far as they come within the scope of this Department should receive its aid and support.

In regard to operations and plans which might be carried out on college farms by the faculty, and which would be more particularly under the auspices of this Department, and for its special use and advantage, I will merely mention some things which present themselves at this time, and which can be solved only by investigations carried on simultaneously in different localities, and others which require the climatic conditions of special localities as may be best for the particular crop or plants to be placed in cultivation.

### CLIMATIC INFLUENCES ON PLANTS.

The peculiarities consequent upon changing seed from one soil and climate to other soils and climates are strongly suggestive that ultimate good will result from a well-conducted series of experiments made over widely diversified climates and conditions, in accordance with preconceived plans, and conducted systematically and co-operatively.

It is well known that climate has very perceptible influences upon the habits of plants; also that these peculiarities are transmitted with a greater or less degree of pemanency to their progeny.

The length of time required to establish a particular habit, say of earliness or lateness, so that its recurrence may be looked for with certainty, has not been a subject upon which there is much of recorded observation. Enough is known, however, to warrant experiment in this direction. We all know that crops are influenced by the soil and climate which produced the seeds from which they are grown; but how far this influence extends or how far it may be subservient to the increase, the period of maturity, or otherwise add to the intrinsic value of crops, are problems concerning which we have no definite knowledge.

This is a point of inquiry which will require several years of concerted observation before it can be answered. The wider the system of interchange of seeds, and the greater the number of simultaneous tests, the sooner can we produce tabulated results from which we can deduce principles for our guidance and future action.

### ROTATION OF CROPS.

The principles governing the rotation of crops do not seem yet to be fully explained. Of course it is well known that it is a factor of success in the general cultivation of crops. In ancient times when land became unproductive it was supposed that it required rest, hence the practice of fallowing was introduced. The Romans allowed the land to rest after each crop; a crop and a year's fallow succeeding each other.

It was a very natural deduction that the land required rest when it was found, after successive crops of the same plant, it refused to grow, although the land had not apparently diminished in fertility.

I need not enter into the details of the reasonings which physiologists advance in explanation of the necessity of rotating crops; various theories have been offered, most of them referring it to the depletion of some ingredient required by the plant, which ingredient, if not exhausted in fact, is not in a condition to be available as plant food, but which, in the case of frequent stirrings of the soil, would become liberated or brought into a soluble state by action of the atmosphere in sufficient quantities to furnish a proper supply for another crop. And this was supposed to be accomplished by fallowing.

The idea has been entertained that chemical analysis would indicate the best line of practice to be followed in regard to the rotation of crops, or perhaps obviate the necessity of any change except that of convenience. This was to be effected by analysis of the soil and the plant to be grown in it, so that the ingredients removed by the latter could be replaced, and thus the fertility of the soil could be maintained for an indefinite period. But, so far, this knowledge has not been promulgated, neither the analysis of soils nor the analysis of plants furnishing the data seemingly necessary for practical purposes.

The phenomena attending the growth of certain crops for a series of years on the same soil apparently includes certain factors which are not readily explained. It is well known that nurserymen, who pride themselves in maintaining a high standard of quality in their salable stock of pear, apple, peach, and other kinds of fruit trees, are careful not to attempt to grow two successive crops on the same land. Even after experimenting with all kinds and quantities of manures which their skill and experience can suggest, the quality of their stock will depreciate if grown a second time on the same soil unless long periods elapse between the rotations.

Even in the case of such humble plants as petunias and verbenas in the flower-beds, it is well known that they cease to give satisfaction when grown more than three years in the same place, notwithstanding the ground is well manured. These and facts of a similar kind might be assumed as an indication that there may be some as yet undiscovered cause that exerts an influence in plant nutrition.

The hypothesis has been advanced that plants excrete injurious matters by their roots, which exert a baneful influence upon future crops of the same plants, but may furnish nutritious matter for plants of a different species; this has also been given as a reason for the benefits which follow a rotation of crops.

It has also been stated that growers have found that a crop of tomatoes which follows a crop of water-melons will show increased productiveness from that circumstance alone. Similarly it has been asserted that the best strawberry crops are those taken from land which produced potatoes as a previous crop. Statements of this kind are not usually and generally made by farmers or gardeners without some basis of fact, and it would seem to be a matter worthy of special observation.

Doubtless there is something yet to be learned on this subject of the rotation of crops, and as it is one of careful observation, rather than of extra skill or large expenditures in making experiments, it is all the more worthy of attention.

## EXPERIMENTS WITH THE COTTON PLANT.

As an example of special work for certain suitable localities I would mention investigations relating to the cotton plant.

It is, of course, well known that there are numerous varieties of cotton under cultivation, each kind possessing peculiarities more or less marked, either in the quality of the fiber, vitality of the plant, especially during uncongenial seasons, or in its prolific qualities and periods of maturity. The exact specific value of any one variety in comparison with other varieties has not, I venture to say, been fully tested as to different localities.

This department, after having collected seeds of as many distinct varieties as could be found, can assign them to colleges in all the cotton-growing States, with instructions, such as to plant them side by side, and to give them precisely similar treatment throughout their growth, and, as often as semi-weekly, carefully to note every detail of the progress of the young plants in connection with rainfall, temperature, &c., time of first flowering, continuation of the blooming period, quantity and quality of lint, with other observations which would be deemed essential in arriving at a just estimate of theit respective values.

This would requireto be continued for a series of years, but, when completed, could not fail in being of much benefit to all persons engaged in the culture of this crop. Determinations would be reached as to the adaptability of certain kinds to certain climates; better varieties than those now cultivated would be indicated for many localities, and thus the profits of the planter would be increased.

The fact which would be evolved by these experiments would be the first step towards the higher development of the cotton plant, as it elicits the preliminary knowledge necessary to the intelligent crossing of varieties for the purpose of combining in one the excellencies of many others, which cannot be done until at least the approximate value of each variety entering into the experiments has been determined.

## IMPROVED VARIETIES BY HYBRIDIZATION.

Plant hybridizing is a subject which requires a keen knowledge of the best lines of progress for the improvement of vegetable products; then the time for, and the performance of, the delicate manipulations necessary in most cases of transferring pollen from one plant to another requires judgment and dexterity. These, however, are obstacles not difficult to overcome, and when we reflect upon the vast possibilities pertaining to, and resulting from, proper systems of hybridization, it becomes a matter of surprise that the process is not more of a common practice than it is.

Most of our improved fruits are merely selections from the common variations of seedling plants, and but few of them can be traced to special hybridizations, so that we may infer that this great highway to improvement has hardly yet been entered upon. There is not a more promising field in which agricultural colleges can distinguish themselves than in developing in this way new and improved varieties of all kinds of fruits, cereals, and other vegetables, and thus obtain varieties better adapted to the locality and more profitable to the agriculturist.

I do not propose to make a list of all the subjects deserving our co-operative attention. I could not do so even if vain enough to attempt the task, but I will allude to one other subject which concerns us all, and that is the diseases of plants.

## DISEASES OF PLANTS.

Where attempts have been made to trace a disease to its origin we find opinions conflicting to a degree apparently irreconcilable. This undoubtedly partly arises from the almost infinite modifications of the various agents which influence plants and which render it extremely improbable that any single observation can be universally correct.

There is scarcely any natural phenomena which may not be explained in various ways, according as they are traced to their primary, secondy, intermediate, or ultimate causes, and as far as it goes each explanation may be equally correct. But this latitude of explanation is a source of much perplexity to the uninitiated who cannot perceive that they may all proceed from the same general principles.

Observations and conclusions published upon the origin and causes of diseases in plants are valuable or otherwise according to the knowledge of vegetable economy possessed by those who favor us with their opinions.

I am aware that in studying plant ailments it is extremely difficult in many cases to decide between a cause and a consequence. This has led to serious mistakes, as, for instance, a recent recommendation to cut down, "stamp out," peach trees, otherwise the fungus growth known as leaf blister, which is seen on peach trees occasionally during the period of leafing, would spread and destroy all the peach trees in the country. This, like most other destructive fungi on plants, being a consequence of diseased leaves caused by unfavorable climatic conditions, could not be "stamped out" permanently unless peach culture should be abandoned, because, supposing that all existing peach trees were destroyed, the first one afterwards planted would be as liable to leaf blister as its predecessors.

The low forms of vegetable and animal growth sometimes, if not always, present in diseased plants must not be taken as certain proof that they are the cause of the disease, the probabilities being that they are present in consequence of diseased organisms.

It is well known that the profitable culture of some of our best fruits is rendered very problematical on account of their liability to fatal diseases. The pear blight is an example. Many apparently conflicting opinions have been published from time to time in regard to the cause of this malady, some attributing it to fungi, and others to bacteria, but withal no remedy is suggested by microscopists so far as I am aware. It has been repeatedly stated that the mere covering of a branch with ordinary lime-wash will entirely exempt the part so covered from attack by blight. This is one of those cases where tests made on agricultural college grounds would become authoritative, and, if of value, would be widely published, and if found to be of no value the result would be equally conclusive in showing its inutility.

Then again we have the serious question of grape mildew, which is really the cause of so much perplexity in the culture of this fruit, and gives rise to so many conflicting opinions regarding the value of varieties in different sections and localities. Only the kinds most resistant of mildew can be cultivated profitably over a large portion of the country. Many, if not all, of the finest fruiting and best flavored varieties are subject to mildew on the foliage, unless they are grown in localities where there is but little dewfall. No application to the soil, so far as is known, and no systems of pruning, or any kind of manipulation as applied to the plant, have any effect in warding off this malady.

Expedients which have for their object preventing the radiation of heat from the leaves have been found a certain preventive of mildew: a board covering the trellis has been found efficient; so also grape-vines growing on trees are not much injured by mildew. This again leads to the conclusion that elevated localities which are wholly or partially exempt from dews would be genial to the grape, and such is found to be the fact. Recorded observations on these subjects would lead to the number of "ascertained facts."

Millions upon millions of dollars are lost annually by the ravages of blights, molds, rusts, smuts, and other vegetable diseases, and agricultural colleges can do a noble work in determining their causes and prescribing remedies.

These suggestions and hints are made in the spirit that we are all mutually interested in the furtherance of a common object. Suggestions are apt in the very nature of the case to be mistaken for dictations. Neither do I undertake to prescribe limits to agricultural education, or say how it can differ or be distinguished from what is ordinarily given.

## KNOWLEDGE NEEDED BY THE AGRICULTURIST.

The agriculturist, above most other persons, must possess a greatly diversified knowledge in order to exercise a proper judgment or approach to uniformity of success in his various operations. He must be conversant with the principles of cultivation; and before he can perceive the *rationale* of his labors he must have a knowledge of the laws—the definite and unvarying principles—of physical science, so far as ascertainable. The field of study thus becomes one of immense magnitude.

How plants grow, how and upon what they feed, why some are fruitful while others are barren, the exact specific relations which exist between them and the soil in which they are growing, and the different developments evolved by the unequal distribution of the elements of growth, are the subject-matter of physiology—a science which comprehends a knowledge of chemistry, botany, and the general principles of natural philosophy. The constituent elements of soils, their numerous combinations, and the sources from which they have been produced, involve the study of mineralogy and geology.

Economy of labor depends upon the skillful application of the laws of mechanics. A knowledge of the laws or principles of hydrostatics and hydraulics is necessary before the farmer can fully understand the science of draining lands, or provide for its proper application or execution. To guard against attacks of insects, or repel those which have found a lodgment in his crops, involves some acquaintance with entomology, and the complicated influences of climate bring him in contact with meteorology and climatology. In short, there is no branch of knowledge that will not contribute to his aid, and may be productive of suggestions directly applicable to some of his varied pursuits.

Who, therefore, can decide as to what is and what is not included in agricultural education and its practical application to the cultivation of plants?

## EXPERIMENTAL FARM WORK.

But it is needless to dwell further upon this line of thought. I have called attention to these topics that I might the more deeply impress upon your minds the value and the necessity of some such work on our agricultural college farms. In my judgment there is nothing which will attract and rivet the attention of the great agricultural public to our agricultural colleges so much as experimental work. Farmers will hope and expect to be benefited pecuniarily by work of this character conducted at the agricultural college farms in their respective States.

On these should be tested every variety of fruit, cereals, grapes, timber trees, and even domestic animals; and those found in all respects adapted to the State should be disseminated by the college, and those not adapted should be discarded, although they might in some other State find a perfect adaptability, and be just what is most needed. In this way one college farm is trying experiments for hundreds of thousands of farmers who can enjoy the benefits and not suffer the losses in cost of labor and time of testing varieties, &c., some of which prove failures.

## GREATER DIVERSITY OF CROPS.

7

In this connection I will state that this country, the best agricultural country in the world, possessing almost every variety of soil and climate, is to-day importing agricultural productions from abroad, and paying therefor tens upon tens of millions of dollars annually that could just as well be produced at home and the amount thus paid out be distributed among our toiling people. The surplus of productions in most branches of farm industry is creating such low prices for farm products that a fair compensation for their production is no longer received, and loss and suffering must ultimately ensue to the farming classes.

To the student of agriculture the necessity of a greater diversity of crops is yearly becoming more apparent, and the most inviting field that is presented is to produce such crops as our commercial needs demand from abroad, if they can be raised here, and I feel assured many of them can be, some in one part of the country and some in another. Here is a promising field for our agricultural college farms, one in which they can be of great use, and I proffer the full aid and sympathy of this Department in obtaining from any nation the seeds or plants of any product that we are now importing if, in the opinion of any of the agricultural colleges, such product would find a congenial home on the farm of such institution. I expect to make such arrangements with our diplomatic and consular service as will enable me to secure all desirable plants and seeds from abroad.

## TEXTILE FIBERS IMPORTED.

The textile and other fibers imported, instead of diminishing with advances in agriculture and population, are rapidly increasing. In 1860 less than 8 tons of flax tow was imported and about 2,300 tons of hemp and 23,279 tons of jute and other fibers, the whole valued at little more than $2,000,000.

In 1870 the flax fiber was increased to 1,927 tons and the hemp to 22,557 tons. The value of these unmanufactured fibers exceeded $6,000,000. In addition raw silk was introduced to the amount of 82,442,918 pounds, valued at $3,139,024.

In 1879 nearly 3,000,000 pounds of cotton were imported, three to four millions in subsequent years, and in 1884 7,000,000 pounds. With flax, hemp, jute, &c., the imports of 1879 exceeded in value $7,000,000. In 1880 and 1881 over ten millions annually, and for three years past about $13,000,000. The statement for three years past is as follows, as kindly furnished me by Col. W. F. Switzler, the Chief of the Bureau of Statistics:

| | 1882. | | 1883. | | 1884. | |
|---|---|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. | Quantity. | Value. |
| Cotton | 4, 339, 952 | $789, 844 | 4, 081, 945 | $800, 532 | 7, 019, 492 | $1, 379, 850 |
| Flax | 5, 563 | 1, 502, 645 | 5, 748 | 1, 621, 839 | 5, 086 | 1, 410, 578 |
| Hemp | 36, 679 | 6, 110, 152 | 29, 063 | 4, 927, 269 | 25, 925 | 4, 227, 876 |
| Jute, &c | 84, 186 | 4, 710, 192 | 125, 318 | 5, 994, 429 | 96, 471 | 5, 055, 853 |
| Coir | 1, 277 | 5, 538 | 111 | 470 | 17, 304 | 56, 979 |
| Istle | 1, 382 | 196, 517 | 356 | 33, 723 | 339 | 37, 832 |
| Total | ........... | 13, 314, 888 | ........... | 13, 378, 262 | ........... | 12, 168, 968 |

The importation of raw silk has increased immensely. The quantity imported last year was 3,222,546 pounds, valued at foreign ports of shipment at $12,481,496. Thus the original cost of all unmanufactured fibers, the raw material of manufactures, amounts to about $25,000,000, and with freight charges and possible undervaluations not much less than $30,000,000 annually.

## FRUITS AND PLANTS FROM RUSSIA.

Perhaps it is not out of place to state here that I have already commissioned Mr. Leo. Weltz, of Wilmington, Ohio, a well known and intelligent nurseryman and fruit grower, with peculiar qualifications for this mission, to collect for this Department from the great steppes of Russia such varieties of all kinds of fruit trees as he may believe will be perfectly hardy and find a natural home in the great Northwest; also to secure such seeds of grasses, timber-trees, and such shrubs and other plants as he thinks may be of value to that section.

As is well known the climate of the Northwestern States is so severe that scarcely a variety of any of our fruit trees is exempt from destruction, while on the steppes of Russia, in fully as severe a climate, scores of varieties of apples, pears, cherries, plums, and even apricots are uninjured and produce large annual crops of fruit. These plants and seeds, when received by the Department, will, in large proportion, be distributed to the agricultural colleges in the States directly interested in them.

Mr. Weltz, intending to visit this country, this Department, at a very small cost, will be enabled, it is hoped, to secure varieties of fruit and timber-trees and other plants that may be of almost inestimable value to that growing section of our country. I state this simply as an instance of what this Department will at all times be glad to do under my administration, if funds will admit, and likewise to show what instruments of good the agricultural college farms of the various States may become.

But the agricultural colleges need not depend solely upon this Department to carry on such experimental work. There should be enterprise enough among their friends and conductors to carry on the most important experiments for the welfare of their people. I know many of them are doing this already—most of them, in fact. All are doing a noble work, but a greater work is needed, and must be accomplished. I recognize the fact how limited are their means for this character of work, and I think appropriations by Congress should be made for special work of this kind. Nothing would be of greater importance to such colleges, or to the agricultural classes of the various States.

## SIGNAL SERVICE IN AGRICULTURAL COLLEGES.

The practical utilization in agriculture of discoveries in meteorological science is an urgent necessity of the present time. The fact will not be disputed that too little has as yet been accomplished in this direction. There have been advances in meteorology, but its practical benefits have inured more to the advantage of commerce than of agriculture.

A partial system of observation was established in 1819, conducted by the surgeons at military posts, at the suggestion of Surgeon-General Lovell. In 1825 a system was established by the New York legislature, requiring teachers of academies that were recipients of the educational fund to take three observations daily. Pennsylvania, Massachusetts, and other States afterwards entered upon similar observations.

In 1849 the Smithsonian Institution commenced its work of observation for the study of winter storms, for the collection of statistics illustrating the climate of North America, the average local temperatures and variations at different periods of the year. The dependence of agriculture upon meteorology became a prominent thought in the mind of Professor Henry, who commenced a series of annual reports upon agricultural meteorology, which were published in each volume of the agricultural reports of the Patent Office from 1855 to 1859, inclusive. In 1863, by arrangement between the Smithsonian Institution and the Department of Agriculture, the returns of observers were tabulated in the Department, and the results were published in both its monthly and annual reports from 1863 to 1870, inclusive.

Upon the accession of Judge Watts as Commissioner of Agriculture this publication was discontinued, and the returns declined, in opposition to the judgment of the Secretary of the Smithsonian Institution, who was compelled to make a new arrangement for their tabulation and publication, which was ultimately made with the Signal Service.

I deem it a misfortune that the design of the scientific institution in which the system originated was not carried to its ultimate beneficent results, as foreshadowed by the able preliminary work of Professor Henry. The inquiry may properly be suggested, in view of the great practical questions of agricultural meteorology to be solved and the momentous importance of the industry to be benefited, whether Congress should not assign to the Department of Agriculture, in co-operation with the agricultural colleges, so much of the work of the Signal Service as pertains to agricultural meteorology. This suggestion should be promptly and wisely considered, the details of the plan of work agreed upon, and the action of Congress invoked at a very early day.

Members of Congress, especially those representing agricultural constituencies, will readily see the utility of a more practical agricultural meteorology, and they will appreciate the necessity of placing such investigation in the hands of professors of agriculture in our institutions of industrial learning, with the co-operation of the Department of Agriculture. They can, and doubtless will, with alacrity and liberality, provide means to render efficient and valuable the investigations so desirable and promising in this direction. It is hoped that the discussions of this subject here will demonstrate conclusively the practicability and necessity of the plan proposed.

So far as this Department is concerned it will co-operate most heartily, most thoroughly with the agricultural colleges and experiment stations of the respective States of this nation. This convention was called for the purpose of forming a bond of union and of sympathy between this Department and the agricultural colleges of the country, and while under existing appropriations and usages it may not be able to do what its Commissioner might desire to have done, yet, year by year, it is hoped the way will be opened to do still more in this direction, making the agricultural colleges of the country the experimental grounds of this Department, testing everything that may prove of value to the farmer, and finally distributing the seed and plants after a thorough test to the farmers of the respective States in which the colleges are located.

It is true I can see the propriety of having a national experimental farm at the seat of government, conducted by this Department, collecting from the four quarters of the globe everything that would be likely to be of value to our agriculture, testing, propagating, and distributing from this central national experimental farm to all sections of the country what would likely be of most value to the agriculturists of these sections, and, if I could go still further, I would have erected on that farm, which should be near the capital, a great permanent national or world's exposition, where the products of this country and of all nations might be shown side by side, that the people of this and of all nations might visit the capital city and see not only the productions of America but of all the nations of the earth.

I believe the day is coming when that which I now mention will be realized, for agriculture is the nursing mother of all our industries, and is entitled to such recognition, and in this exposition would bring with her her handmaids—manufactures and commerce. [Applause.]

Mr. HENSHALL. To save time, sir, and expedite matters, I move you that the temporary organization of this convention be made a permanent organization.

The CHAIRMAN. I would state that that motion would not be in order until we have a report from the committee on credentials to see who compose this body.

I will read a letter which I have just received from Miss Cleveland at the Executive Mansion. I do not think it was intended as a confidential letter, and as she has shown a laudable interest in one of the industries of which I have been speaking, I will take the liberty of reading it:

EXECUTIVE MANSION, *Washington.*

COMMISSIONER COLMAN: I venture to ask if the subject of silk-culture in the United States is one which will receive attention from the agricultural convention? I find myself feeling a deep interest in this industry, not only because it seems right and fitting that we should produce our own silk in successful competition with the Old World, but because this industry, when so established, as it may be, by encouragement of the central Government, will afford one more avenue of support to women. I am sure you desire with me to see such avenues increased in worthy and legitimate ways.

I am hoping to have the pleasure of visiting your Bureau before long.

Very truly yours,

ROSE ELIZABETH CLEVELAND.

JULY 8, 1885.

[Applause.]

The committee on credentials is nearly ready to report; those who have not handed in their names will oblige me by handing them in as early as possible, that the committee may report.

Gentlemen of the convention, I have the pleasure of introducing to you Mr. T. Tamari, a commissioner from Japan, who has honored us with his presence and who manifests a deep interest in our agriculture.

Mr. TAMARI. I am greatly honored by being called upon to speak to you upon agriculture, but the call is a very unexpected one to me. I came to your country only about eight months ago, and I am as yet unable to speak English very well, for which I am very sorry. But I will prepare a paper for this convention concerning our agriculture in Japan, to be laid before you at another time. I am unable to say more than this at the present time. I again thank you for your kindness.

The CHAIRMAN. If our friend cannot speak our language well, gentlemen, we know that his heart is with us in this work, and we are heartily glad to welcome him to our convention. We hope that the country he represents and our own may be benefited by what we shall learn from each other.

Some inquiries have been made of me in regard to a trip to Mount Vernon; I expected to be able to take you down on a Government vessel, but I have received a letter from the Secretary of the Navy saying that both of the boats ordinarily stationed here, and which were suitable for such an occasion, are now in New York, but for which he would have great pleasure in granting us their use. The Government not being able to provide a vessel, I have made arrangements so that we can go this evening at 4 o'clock, to-morrow evening at 4 o'clock, or Friday evening at 4 o'clock. The cost of the round-trip they have reduced to 75 cents for each person who may desire a passage. It will be for you to determine when you desire to go. I also expect to make arrangements, if the President is sufficiently disengaged, to call upon his Excellency to-night or to-morrow night, or Friday night in a body, and pay him our respects; that matter will be entirely left to you to designate the time, after getting organized. I see that the chairman of the committee on credentials is present, and, I believe, is ready to report.

Mr. FAIRCHILD. The committee have found so goodly a body of us present that it seems unnecessary to make invidious distinctions, and the report as presented will give the names of delegates from the institutions of the several States, and from other societies and associations also representing States.

The CHAIRMAN. I think it will hardly be necessary to read them over; perhaps you can just hand them in.

Mr. FAIRCHILD. There may be some who do not know that we desire their names and credentials.

The CHAIRMAN. Well, then, the list had better be read.

The committee reported the following named delegates present:

Armstrong, W. A., trustee experimental station, New York.

Atherton, President G. W., State College, Pennsylvania.

Armsby, Prof. H. B., State University, Wisconsin.

Alvord, H. E., director, Houghton Farm experimental station, New York.

Blanpied, Prof. R. T., State Agricultural College, New Hampshire.

Burrus, Prof. J. D., Alcorn, Mississippi.

Curtis, F. D., Charlton, New York.

Curtis, Prof. G. W., Agricultural and Mechanical College, Texas.

Cook, Prof. G. H., Rutgers College, New Jersey.

Chamberlin, Hon. Henry, State Board of Agriculture, Michigan.

Colman, Hon. N. J., Commissioner of Agriculture.

Collier, Dr. Peter, Washington, D. C.

Dodge, Allen, of Board, Maryland.

Dodge, J. R., Department of Agriculture.

Dabney, C. W., director experimental station, North Carolina.

Dinwiddie, President H. H., Agricultural and Mechanical College, Texas.

Dwinelle, Prof. C. H., State University, California.

Eggleston, N. H., Department of Agriculture.

Fernald, President M. C., State College, Maine.

Fairchild, President G. T., State Agricultural College, Kansas.

Goessman, Prof. C. A., State Agricultural College, Massachusetts.

Gold, Hon. T. S., secretary of Board of Agriculture, Connecticut.

Glenn, Prof. J. W., State University, Tennessee.

Ghequier, A. de, Agricultural College, Prince George's County, Maryland.

Harrison, Hon. R., Commissioner of Agriculture, Virginia.

Hughes, L. C.

Henshall, Hon. Thomas, of Board, Kansas.

Johnstone, Hon. P. P., of Board, Kentucky.

Johnson, J. R., Agricultural Wheel, Arkansas.

Knapp, Prof. S. A., State Agricultural College, Iowa.

Knapp, Prof. H., State Agricultural College, Iowa.

King, W. M., Department of Agriculture.

Lee, President S. D., Agricultural and Mechanical College, Starkville, Mississippi.

Lemmon, J. G., New Mexico.

Lemmon, Mrs. J. G., New Mexico.

Ledoux, A. R. (formerly experiment station), New York.

Lazenby, Prof. W. R., State University, Ohio.

Lewis, President D. W., Northern Georgia College, Georgia.

McGeehe, Hon. M., of Board, North Carolina.

McMurtrie, Prof. William, State Industrial University, Illinois.

McWhirter, Hon. A. J., commissioner of agriculture, Tennessee.

Myers, Prof. J. A., Agricultural and Mechanical College, Mississippi.

Maurice, B., ex-professor, State College, Maryland.

Needham, G. F., State Horticultural Society, Maryland.

Neumann, Prof. J. S., State University, Alabama.

Nesbit, F. C., Department of Agriculture.

Nicholson, Prof. G. D., State College, Maryland.

Piolet, Hon. V. E., of Board, Pennsylvania.

Phares, Prof. D. L., Agricultural and Mechanical College, Mississippi.

Patterson, President J. K., Agricultural and Mechanical College, Kentucky.

Patterson, Prof. W. K., Agricultural and Mechanical College, Kentucky.

Peabody, President S. H., State Industrial University, Illinois.

Piotts, W. M., Pennsylvania.

Riley, C. V., Department of Agriculture.

Rinchi, J. K., Japanese commissioner.

Roberts, Prof. J. P., Cornell University, New York.

Smith, President A. J., State College, Maryland.

Sanborn, Prof. J. W., State University, Missouri.

Sturtevant, E. L., director experiment station, New York.

Switzler, Hon. W. F., of Board, Missouri.

Scott, Hon. D. W., of Board, Illinois.

Spurr, Hon. R. J., of Board, Kentucky.

Salmon, D. E., Department of Agriculture.

Saunders, William, Department of Agriculture.

Strider, Hon. J. H., of Board, West Virginia.

Townshend, Prof. N. S., State University, Ohio.

Thorne, C. E. (editor Farm and Fireside), Ohio.

Taylor, Thomas, Department of Agriculture.

Tamari, T., Japan.

Vasey, George, Department of Agriculture.
Whitman, Hon. E., of Board, Maryland.
Watkins, J. R., Louisiana.
Wing, Prof. H. H., State University, Nebraska.
Willits, President Edwin, State Agricultural College, Michigan.
Woodhull, M. V., of Board, Dakota.
Wiley, H. W., Department of Agriculture.
Wardwell, D. K., Arizona.
Wise, M. R., Arizona.

Mr. HARRISON. I am commissioner of agriculture from Virginia. I did not know that the commissioners would have any status in this body, and therefore I did not report to the committee.

The CHAIRMAN. You have, sir; commissioners are invited. What are your initials?

Mr. HARRISON. Randolph Harrison.

The secretary entered the name upon the list, and the report was unanimously adopted by the convention.

The CHAIRMAN. Now, gentlemen of the convention, if you will appoint one or two other committees we will be ready then to go to work immediately after you convene this afternoon.

Mr. HENSHALL. I move that a committee of five be appointed on rules and order of business.

A DELEGATE. Make it seven.

Mr. HENSHALL. Make it seven, then.

A DELEGATE. I would suggest, Mr. President, that the permanent organization be first perfected before we attempt——

Mr. HENSHALL. I withdraw the motion temporarily, and renew my motion that the temporary organization be made a permanent organization.

This motion was agreed to.

Mr. ALVORD. I desire to offer this resolution, sir:

*Resolved,* That there be a standing committee upon order of business and resolutions, to consist of the Commissioner of Agriculture and six members appointed by the chair, and that to this committee be referred without debate the opening address of the Commissioner; all subjects brought before this convention for discussion or action, whether by resolution or otherwise; that the reports from this committee may be presented at any time and shall receive immediate consideration.

A DELEGATE. I second the resolution.

The PRESIDENT. I would like to impress it upon your mind that when you rise you give your name and State.

Mr. ATHERTON. I rise to suggest to the mover of that resolution a slight modification which I think might facilitate our business. I am not quite sure on that point, but it occurred to me that when the suggestion was made for the appointment of the committee on the order of business and resolutions, that that would be the most important working committee for the entire session of the convention that can be appointed. We have all found, of course, that such a committee is necessary in order to keep the run of the business and adjust the time of the session, and the time that shall be given to certain subjects, &c. It seems to me that that, however, is a practical working committee, whose functions cannot properly be confounded with another committee, which shall formulate, in its final statement, the outcome of the convention, and I should have moved at the proper time the appointment of a committee on the president's address; simply to take the president's address as a basis for the final conclusion that the convention will reach on matters of policy.

I would suggest, therefore, that reference to the president's address be left out of that resolution, and then that a special committee of five, or seven, or nine be appointed to consider and report upon the suggestions contained in the president's address, and such other matters of permanent policy as this convention may care to formulate. It would then leave the working committee on order of business and resolutions entirely free to run the convention, as it were, and save our time by properly distributing the order of subjects; and it would leave this other subject open for a detailed, full, and deliberate consideration of the committee to report on the last morning of the convention. I suggest, therefore, that the president's address be left out, and that a separate committee be appointed on that subject.

Mr. WILLITS. It seems to me that inasmuch as the president's address really covers the whole ground, that it should be before the committee on order of business to show what we have to do. That is the business of the convention. You can hardly suggest a subject that has not been covered by the president's address, and it is one of the means of bringing the whole matter before the convention. It seems to me that it is very proper for it to be before the committee on order of business.

The PRESIDENT. I would state, gentlemen, that there has been no amendment offered to the resolution, simply a suggestion. It is hardly worth while to take up our time unless an amendment be offered and it be supported by a second.

Mr. DABNEY. I move that the resolution just offered be amended by striking out the proviso that all resolutions or business before the convention shall first be referred to this committee, and if the amendment I offer finds a second, I would like to state my reasons.

A DELEGATE. I second the motion.

Mr. DABNEY. As I understand it, the Commissioner has called a meeting of all persons interested in the furtherance of scientific agriculture in the country, for the purpose of consultation, for the purpose of getting at the ideas of every man, and I dislike very much to see the work of this convention limited to the ideas of seven men, or to the ideas or proposals which seven men shall approve. I know that the gentleman does not intend any restriction in offering the resolution, and I therefore call his attention to the fact, in the hope that he will accept the amendment. I think it will be a great disadvantage to us if the resolution is adopted in its present form. I think we can have nothing but benefit from the free expression on this floor of the proposals and plans of every man present, and while they may sometimes be not altogether proper, they can easily be cut short by silence or by referring those subjects to the committee, after the proposal has had a chance and a hearing. I am in favor of every man having a hearing; I am willing to limit the speech of the person offering a resolution to three minutes, if necessary, but I want every person having anything to propose to have a hearing upon this floor. I take it that it is for this purpose that we are assembled.

Mr. CURTIS, of Texas. I desire to second Professor Dabney's amendment.

Mr. ALVORD. It seems to me that the resolution, as originally offered, removes the objection of Dr. Dabney and Professor Curtis. Under this resolution any member of the convention will have the right to present any subject and give it a practical presentation, but before that subject is debated or considered by the convention, the resolution would carry it to the committee and save the time of the convention. I shall vote against the amendment, not considering it necessary to the object sought by the gentleman himself.

Mr. DABNEY. I see that if we change that amendment, so as to strike out the words "without debate," that the purpose aimed at will be accomplished; I, therefore, beg leave to change the amendment and strike out the words "without debate," so that we can have a fair presentation of the subjects.

The PRESIDENT. No objection being made, the gentleman has leave to withdraw his amendment; now a new amendment is offered to strike out the words "without debate."

Mr. ALVORD. I hope that that will not prevail, for the reason that it simply opens the convention to unlimited debate on any subject that may be presented, before any committee has had an opportunity to get it properly placed on the programme, and we are liable to have any subject or any resolution which might excite considerable debate and occupy half a session present itself before an opportunity is offered to get it on the programme in a proper way.

Mr. SANBORN. I believe in open, full, and free debate; I do not think the men who came to this convention came to idle away their time; to attempt now to shut off free debate on questions that may arise here, is based on the presumption that some of them came here with idle tales to tell us; therefore, sir, I move this substitute, that a committee of three be appointed by the chair—the smaller the committee the better—that a committee of three be appointed, to whom shall be referred such matters as the convention shall choose to refer to them. After we debate a question for a short time refer that to it.

The PRESIDENT. The chair would state that that makes three definite issues before the convention; one is on the original resolution, next on the amendment of Mr. Dabney, and next of another entirely different proposal; of course this is not in order.

Mr. SWITZLER. This is a very practical proposition, and I think if we look at it from a practical standpoint, we will see at once the path of duty. Now, practically, under the original proposition, there could nothing come before this body whatever. I state it broadly, because the language of the original proposition justifies this statement. Nothing can get before this body for debate unless it passes through the hands of this committee; any proposition or resolution that may be introduced goes without debate to this committee, and after this committee shall have, in its discretion, reported upon any proposition or design or interest, and not until then, can you debate anything. Therefore, while this committee is out in one of these groves, or in one of these committee-rooms, considering the various propositions which we shall respectively submit, we do nothing except to sit in our seats here and await their action, and not only that, but await their pleasure. I am against it, and I am for the amendment of the gentleman from North Carolina, and, that is, that these questions should be submitted by the convention to the committee. That is all right; that is proper; that is done in every deliberative body, but only after debate. I know the argument which suggests this committee. That is: Speakers here may tire the convention with debate. Why, gentlemen, you have the whole thing in your hands. If a proposition is before the body, and is being debated to a length, or in any manner, or by methods which you may not desire, get the floor and move the previous question; or, if not that, move that this matter be referred to this committee, and if the majority is in favor let them say that, and this ends the matter; but if you intend to tie your hands here, so that every matter shall go to this committee first, then, sir, let us go to Mount Vernon and instruct the committee to tell us to-morrow what we shall do.

Mr. SMITH. Mr. President, if I understand the circular put forth by you in bringing this convention together, I think that it had reference simply to the solution of the problem with reference to agricultural education as connected with agricultural colleges. Certainly, sir, that was a fair inference to be derived from reading it. Now, sir, when I read that circular I looked upon it as the most important convention that has ever been called for the purpose of promoting agricultural education as connected with agricultural college work. If it was not for that I consider we are here for little or nothing. What is the use of calling a convention here like some others that have been called and discussing another problem? We can discuss all those questions enumerated in your admirable address at other meetings. We have opportunities to do that at our club meetings, at our agricultural fairs and State conventions, but we have no opportunity to discuss this question of agricultural education as connected with agricultural colleges, and I think, sir, this is an auspicious time for us to decide whether or not the colleges are the useful institutions and are capable of carrying on the useful work which is to benefit agriculture; whether or not a great majority of the people are correct in believing that agricultural colleges are of no use, or whether we can devise some means by which we can satisfy the people that we are an essential and indispensable institution in connection with educated agriculture?

Now, sir, why have any committees? Why not let us address ourselves to that question and that question alone? If I felt that I had the sympathy of this convention—this is simply my own notion, and I do not know whether I am correct or not—I should feel like making a motion to this effect: Resolved, that the work of this convention shall be simply, solely, and exclusively for the discussion of an educated agriculture as connected with agricultural colleges and other kindred institutions; by which I mean, of course, the universities who have this work, the experiment stations, and all kindred institutions. Now that covers the whole ground. We haven't got much time to sit here to talk up those other questions. There is enough in your address, sir, to discuss for months. Why let us do that? Why have discussion on those questions which you can discuss at any time?

In my conversation with you in reference to this convention I was glad to hear you say that it was your interest in agricultural colleges and agricultural education which was the main thing that induced you to call this convention. Now, the document which you have presented as a matter of courtesy and propriety should go to a committee, to be considered by it; let that be done, and let these questions which you have presented there in your address be carried home by the members of this convention, and be discussed by them in the conventions and agricultural societies that they may get together; but do not let us discuss in this convention anything but the one problem to which I have alluded; let us fill the minds of the people with that idea, and let us break down this cry that agricultural education is a failure, and especially so in connection with agricultural colleges. In my opinion we can do it, and here is a grand opportunity presented to us by the Commissioner of Agriculture to discuss that question, and I think that is the only question properly before us.

Mr. SANBORN. The motion I made was a substitute for the original motion and amendment, and the motion is in order because it is substituted for the original motion.

Mr. WILLITS. Of course, the original mover has the right to amend and perfect his motion before the substitute is in order.

The PRESIDENT. The question is—there has been no independent resolution offered—as I understand it, the question now is on the amendment to strike out the words "without debate." Are you ready for the question?

The question being put, the chair was unable to decide the result, and a division was called for. Twenty-seven delegates voted in favor of the amendment and eighteen against it. The amendment was therefore adopted.

The resolution, as amended, was then agreed to.

The PRESIDENT. I will announce the names of the committee, which will be ready to suggest some business immediately on our reassembling this afternoon. The committee will consist of Messrs. Alvord, of New York; Lee, of Mississippi; Knapp, of Iowa; Fernald, of Maine; Atherton, of Pennsylvania; Willitts, of Michigan.

Professor RILEY. I would offer a resolution which I believe will cause no discussion:

*Resolved*, That this convention has listened with pleasure to the sentiments expressed by Miss Rose Elizabeth Cleveland in her letter addressed to Commissioner Colman on the subject of silk culture in the United States; that we are in sympathy with those sentiments, and that Miss Cleveland is most cordially invited to honor this body with her presence and to take part in its deliberations.

The resolution was unanimously adopted.

Mr. SANBORN. Mr. President, as on that committee on order of business the experiment stations of the country are not represented, I move that Dr. Dabney, of North Carolina, be added.

The PRESIDENT. No objection being made, the name of Professor Dabney will be added to the list of members of the committee. At what hour do you wish to meet this afternoon? I would suggest about 2 o'clock.

A DELEGATE. I move the convention adjourn until 2 o'clock.

The motion was agreed to; and accordingly, at 12 o'clock and 30 minutes, the convention adjourned.

## AFTERNOON SESSION.

The convention assembled at 2 o'clock, pursuant to adjournment, President Colman in the chair.

The PRESIDENT. Gentlemen, you will please come to order. As you take your seats I would be glad to have you take them as near to the front as possible. It is better for us to be pretty well compact, and I would suggest—it is hardly necessary to do it—that any conversation going on while the body is in session very much disturbs the proceedings and embarrasses the speakers, and I hope that if any persons want to talk with one another that they will step outside, so as not to interfere with our proceedings.

I think it is desirable to take action in reference to some of the visits which it is proposed this body shall take, so we can make arrangements accordingly. I have just come from the White House, and was informed by the President that he would be very much pleased to meet the delegates at 3 o'clock to-morrow, or at half past 1 on the day after to-morrow. The Cabinet being in session, he cannot meet you at as early an hour to-morrow. I would say, also, that several delegates have spoken to me with reference to visiting Mount Vernon. As I stated this morning, we have a boat engaged to leave this city at 4 o'clock on any day that you wish to select. The trip will consume three or four hours. The cost to each person will be 75 cents. I don't know but that to-morrow would be considered a good time. We could visit the President at 3 o'clock, and then go from the White House to the boat. This would quite use up the entire half day. We could postpone the latter visit until the next day. I thought it would be well enough to advise you of the matter, so that you might confer among yourselves and decide whether you desire to go down to Mount Vernon after visiting the President to-morrow afternoon or whether you prefer to defer that visit until Friday. I will say, also, in this connection that I am quite anxious that all of those present should visit the Smithsonian Institution and the National Museum. I think you will find many things there to interest you.

Mr. SANBORN. To save time, I move that these visits be made to-morrow. There are very many who will not be here after to-morrow, and who might wish to visit the President before they leave.

A DELEGATE. I second the motion.

The PRESIDENT. That is open for discussion.

Mr. ALVORD. Mr. President, that is one of the matters with which our committee has been dealing; it is the second on their list of subjects.

The PRESIDENT. The chairman of the committee on the order of business says that that matter will be reached in a very few minutes. [To Mr. Sanborn.] Have you any objection to withdrawing your motion?

Mr. SANBORN. No, sir; I withdraw it.

Mr. ALVORD. The committee on order of business is prepared to report under several heads for immediate action, matters that we believe will take no time to discuss. First—

*Resolved*, That there be now elected five vice-presidents to complete the permanent organization of this convention.

The PRESIDENT. Gentlemen, you have heard the report of the committee; what action shall be taken in regard to it? If there is no objection to the report, it can be considered adopted; if there is no objection, it will be considered as adopted unanimously. Now, gentlemen, you will proceed to the election of these vice-presidents in such way as you may see proper. I would suggest that they be, of course, from five different States, and further, that they should come from different sections, so far as may be, so that various sections may be represented.

A DELEGATE. I move they be appointed by the chair.

The PRESIDENT. The chair would like to escape that duty.

The motion was agreed to.

The President. The first order of business is adopted, and I will hand in the appointments to save time, although it is an embarrassing position for me.

Mr. Alvord. Mr. President: The second resolution of the committee is as follows:

*Resolved*, That the daily sessions of this convention be from 10 a. m. to 12.30 p. m., and from 2 to 5 o'clock p. m.

The President. Do you propose to have no night sessions?

Mr. Alvord. That was the only action of the committee.

The President. Gentlemen, you have heard the report of the committee; what action will you take?

Mr. Curtis, of Texas. Will that exclude night sessions and facilitate business if we wish to go away to-morrow?

The President. It will not necessarily exclude night sessions, because the body that makes these rules has the power of changing them to suit itself.

Mr. Curtis, of Texas. It seems to me it would be better to lay that part of the resolution on the table for the present. A gentleman suggests that that can be modified by saying simply that we begin at 10 in the morning and 2 in the afternoon; we could adjourn then to suit ourselves.

The President. Do you offer that as an amendment?

Mr. Curtis, of Texas. Yes, sir.

The President. That the sessions of this convention shall commence at 10 o'clock in the morning and at 2 o'clock in the afternoon?

Mr. Alvord. The committee accept the amendment.

The President. The question now is upon the adoption of the report as amended.

The report was adopted.

Mr. Alvord. The third resolution of the committee is that on Thursday afternoon the adjournment of the convention shall be at 3 o'clock, to give members an opportunity to call upon the President, and then to participate in an excursion to Mount Vernon; and that the president of this convention be requested to convey to his Excellency, the President of the United States, the pleasure of the convention to meet him at 3 o'clock in the afternoon of to-morrow.

The President. There is only one question. Do we want to come back here after we meet the President at the White House?

A delegate. That can be determined to-morrow.

The President. Gentlemen, you have heard the report of the committee. What action shall be taken?

The report of the committee was unanimously adopted.

Mr. Alvord. The committee now desire to request all members having papers prepared to be read at the convention, and all persons who have business which they are desirous of presenting for the information of the convention by resolution, or otherwise, should inform the committee by memoranda, in order that a suitable place may be assigned for those subjects on the programme after to-day; and the committee will hold a session immediately after the adjournment this afternoon, and endeavor to arrange a programme for to-morrow.

For this afternoon's session, with the expectation that it will lead to a discussion probably occupying the session, the committee present the following resolution for the consideration of the convention:

*Resolved*, That the condition and progress of American agriculture require national aid for the investigation and experimentation in the several States; and that, therefore, this convention approves the principle and general provisions of what is known as the Cullen bill of the last Congress, and urges upon the next Congress the passage of this or a similar act.

Mr. WOODHULL. I would like to have that resolution amended by inserting after the word "States" the words "and Territories," so that it will read "States and Territories."

Mr. ALVORD. The amendment is accepted by the committee.

Mr. SWITZLER. Mr. President and gentlemen of the convention, at the informal meeting of this body last evening at the Ebbitt House I gave notice that at the proper time I would bring to the consideration of the convention a resolution the nature of which was substantially foreshadowed in the item from the committee on business which has just been read. If it is now in order, Mr. President, I will read that resolution, which will bring before this body the question of Federal aid to the agricultural colleges, or to the experiment stations, which may have been or will hereafter be established:

Whereas the Congress of the United States in July, 1862, passed an act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and mechanic arts, where the leading object shall be, without excluding other scientific and classical studies and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life; and

Whereas the interest designed to be promoted thereby requires the labor of 7,500,000 men and gives direct support to one-half of our population; has invested in its land $10,000,000,000; in its implements and machinery, $400,000,000; in its live stock, $1,500,000,000, and in its products an annual value of $2,200,000,000; therefore be it

*Resolved*, By this convention of representatives of the various agricultural colleges of our country, that the bill introduced in the last Congress by Mr. Cullen, of Illinois, from the Committee on Agriculture, to establish agricultural experiment stations in connection with agricultural colleges, and appropriating, for the payment of the salaries and wages of the directors and other employés of said stations and the necessary expenses of conducting investigations and experiments therein, the sum of $15,000 per annum to each State, meets with our hearty indorsement, provided that in States which established no agricultural colleges, but in which experiment stations exist, said appropriation shall inure to their benefit, and in States where more than one station is established the legislature thereof shall designate the station to which the appropriation shall be paid.

The PRESIDENT. "Station or stations." I would put that in.

Mr. WOODHULL. Mr. President, I would like also to have the word

"Territories" introduced after States; Territories should receive the same assistance as States.

Mr. Switzler. Mr. President, if the circumstances under which we have assembled permitted extended remarks, and you, ladies and gentlemen, had time to hear and I time or inclination to utter at length the views I entertain in reference to this important proposition, I might elaborate them and recall the history of the legislation by the Federal Congress which pertains to the new legislation which we propose. But I believe that in regard to the great question of Federal aid, especially in this direction, there will be but one opinion here; and this being my conviction I shall not impose upon this body, even if it were so courteous as to hear me, any elaborate discussion of it.

I desire to say, however, Mr. President—and the statement is due to myself and this body—that whilst in my own State I have had in one sense no official connection with the State University or the Agricultural College, that during the varied and eventful history of these institutions I have not held a professorship in either of them—yet for many years I have had a seat upon the board of curators, with the honorable president of this convention and others. As a journalist, as a member of the legislature, as a member of the convention which framed the present constitution of Missouri, in which there is an expressed organic recognition of the State University for the first time in the history of the State, I did my utmost to promote the best interests of the Agricultural College and University. And I now appear in this body as a delegate, recognizing it as a representative body, the members of which have come up here from the various States and Territories of the Union to take counsel together in regard to that which is not only of present interest but of growing and prospective importance to the people. This body has it in its power not only to command attention in the Federal Capitol, not only to have the committees of each house of Congress listen to its counsels and to its demands, but, if its proceedings shall be distinguished by wisdom, it will command the votes of both houses and an appropriation from the Federal Treasury of $15,000 annually for these institutions of learning; for, according to the theory of these statesmen themselves, every interest of our country reposes for the present and for the future upon the agricultural interests of the country.

What is it we propose and why is it we ask Congress to pass this bill? It is, first, because the agricultural colleges in the several States of the Union and the experimental stations in the States and Territories where there are no agricultural colleges established, while the experiments themselves are valuable, it is perfectly evident that on account of the diversified conditions of temperature and soil, and more especially because of the proverbial impatience of the people in respect to experiments that concern agriculture, they are comparatively impotent for good. The people of the States and Territories are impatient for practical results. The farmers as a class do not claim to be logicians; and in regard to experimental stations and agricultural colleges, also, show themselves to be illogical, in this: that whilst they are perfectly willing to wait for the autumn to develop the crops which may be sown in the spring, in respect to agricultural education and the results of experiments at experimental stations they are unwilling to wait. They desire you distinguished gentlemen to plant to-day so that they can reap to-morrow; and the States themselves, on account of the large public debts of many of them, and the diversity of interests in the legislatures and in the counsels of the colleges themselves, will not wait, cannot afford to wait; whereas experiments authorized and provided for by the National Legislature, with the Federal Treasury at its back, can wait for full development and achievement—do wait—can afford to wait.

That Treasury belongs to the agriculturists of this country, and they ought to make a requisition upon it for the promotion of this great interest. Without amplifying the policy which found expression in the admirable opening address of the presiding officer of this convention this morning, suffice it to say there ought to be in every State and Territory of the Republic at least one experiment station to project such experiments in regard to seeds and plants and forestry and plant-life, and the whole economy of vegetable production, so that practical results shall be evolved therefrom, and that these experiments, sometimes under similar conditions of temperature and soil and climate, shall be reported to a central head at Washington, where, having gone through the winnowing mill of experts whom we have cause to believe are located here, a practical knowledge of what is thus evolved shall be published for the benefit of the people.

These stations, valuable as they are in the several States and Territories, will never accomplish their greatest good until they shall be organized in such manner and under such conditions that their experiments shall be systematically reported to the Agricultural Department of the nation, and from the Agricultural Department go in an intelligible, simplified form to the people.

After this bill shall have been passed, Mr. President, and $15,000 are expended annually by each of the agricultural colleges and experiment stations, then we will see in this form, and in the light of this appropriation, a national recognition of one of the great and all-important interterests of the country. My experience with the farmers in the legislature and other organized bodies is, they are slow to perceive their true interests; slower than bankers and railroad managers, than lawyers and other professional classes, and the commercial men of the country. I am, therefore, rejoiced to believe there is being awakened in all the States of the Union a new interest in regard to that great and paramount interest on which reposes every other. To disclose some of its relations I have attempted to bring out in the preamble to my resolutions certain statistical facts in regard to the agricultural interests of the United States. I would impress these facts (deducible from the last Federal census) upon the intelligent farmers of every State in order that they may realize the importance of the industry they prosecute.

By the act of July 2, 1862, establishing the agricultural colleges, there was appropriated by Congress 17,430,000 acres of land, given to the States as an inducement to the maintenance of agricultural colleges, and worth to-day, according to the estimate the best statisticians have made in regard to it, more than $7,500,000.

And what is this industry, Mr. President, which you and this body represent? About 7,500,000 men are required to prosecute it, and it maintains more than one-half of the population of the nation. Do we properly appreciate the great fact as representatives of the agricultural interests of our country, do the farmers themselves appreciate it, that the land owned in fee-simple by the farmers of the United States is worth to-day, according to the Federal census of 1880, $10,000,000,000? Do we appreciate the fact that the farmers whom we represent pay the taxes, and in the event of war fight the battles of the country, and numerically are in a very large majority? These are reasons, it does seem to me, addressed to the patriotism and intelligence of our statesmen, which ought at once to induce them to vote for very liberal appropriations to promote that which you, sir, very fitly denominated "the nursing mother of all the industries of this country."

The wisest statesmen of this and other lands and of this and other times shared this view of agriculture. Typical of these was Washington, who, in his last message to Congress, December 5, 1796, said:

> It will not be doubted that with reference either to individual or national welfare, agriculture is of primary importance. In proportion as nations advance in population and other circumstances of maturity, this truth becomes more apparent and renders the cultivation of the soil more and more an object of public patronage. Institutions for promoting it grow up, supported by the public purse; and to what object can it be dedicated with greater propriety? Among the means which have been employed to this end none have been attended with greater success than the establishment of boards, composed of proper characters, charged with collecting and diffusing information, and enabled by premiums and small pecuniary aid to encourage and assist a spirit of discovery and improvement. This species of establishment contributes doubly to the increase of improvement by stimulating to enterprise and experiment and by drawing to a common center the results everywhere of individual skill and observation and spreading them thence over the whole nation. Experience accordingly has shown that they are very cheap instruments of immense national benefits.

Even at that early period of our history, when American agriculture was in its infancy, Washington caught distinct glimpses of the experimental stations we propose to establish by national authority and "support by the public purse." He also foresaw that the results of experiment, and of individual skill and observation, to be made in the highest measure available for good, should be "drawn to a common center and spreading them thence over the whole nation."

Coming down to later times, I present an extract from the address of Hon. Stephen A. Douglas, at the annual fair of the New York State Agricultural Society, held at Rochester, 1851. Speaking of agriculture, he said:

> It is now a profession, calling to its aid science and the mechanic arts, and in its every branch the inventive genius of man. The farmer, instead of following the beaten track of his ancestor, now brings to his pursuit his own powers of inquiry and investigation. Chemistry teaches him the nature and quality of the ingredients composing his soil, the species of crop most suitable to its productive power, and the kind of manure he must use, and the proportion of cattle he must keep to make his farm productive. As he acquires a knowledge of chemistry, of agricultural geology, and of the physiology of plants and animals, his crops become more certain, and his reward more sure.

Not to weary you with extracts from the writings of our statesmen, I beg to add another from an address delivered before the Bristol County (Mass.) Agricultural Society, on occasion of their annual show and cattle fair at Taunton, October 15, 1852, by Hon. Robert C. Winthrop. It is very pertinent and suggestive:

> But while the great substratum of all education for all pursuits is abundantly and admirably supplied by our common schools, no one can fail to perceive, or hesitate to admit, the advantages which may accrue from something of a more specific and supplementary instruction for those to whom the care and culture of the American soil is to be committed. The earth beneath us has been two long regarded and treated as something incapable of being injured by anything short of a natural convulsion, or a providential cataclysm. We have been so long accustomed to dig it and ditch it, and drain it, and hoe it, and rake it, and harrow it, and trample it under our feet, and plow long furrows in its back; and have so long found it repaying such treatment by larger and larger measures of endurance, generosity, and beneficence, that we have been ready to regard it as absolutely insensible to injury. Because our chains and stakes have exhibited from year to year the same superficial measurements, we have flattered ourselves that our farms were undergoing no detriment or diminution. We have remembered the maxim of the law, "He who owns the soil owns it to the sky," and have been careful to let nothing interfere with our air or daylight; but we have omitted to look below the surface, and to discover and provide against the robbery which has been annually perpetrated, by day and by night, upon its most valuable ingredients and elements.
>
> The discovery has at last been made, the danger has been revealed, the alarm has been sounded; and if the Government can provide bounties for the destruction of the wolves and bears and foxes which threaten our flocks, our herds, and our henroosts, I see not how it can withhold some seasonable provision against the far more frequent and more disastrous depredations by which our soil is deprived of its treasures, through the want of science and skill on the part of those who till it. * * * Whether the promotion of agricultural education shall be undertaken through systematic courses of scientific lectures, or by agricultural schools and colleges, with experimental farms attached to them, or by the preparation and distribution of agricultural tracts and treatises, or by all combined, it is for the farmers to say. What they say will not fail to be rightly and effectively said. With them words will be things; for no Government will venture to resist their deliberate and united appeals.

These extracts are remarkably suggestive in view of the legislation we propose to commend to the favorable consideration of Congress, and I regret want of time forbids the review their importance and wisdom demand. But their very pertinence and force suggest the commentary and make the application.

Mr. President, I shall not further trespass upon your patience than to express the hope that the counsels of this convention, a body representative in numbers, intelligence, and official position, will redound to the best interests of the country by bringing about union of effort and sympathy between the Agricultural Department of the nation and the agricultural colleges and experiment stations in every State and Territory of the Republic, and to this end that the sluggish current of our farmers' devotion to their own interests and education, may be quickened and intensified. [Applause.]

Mr. KNAPP. I was going to move the reference of the resolution to the committee on resolutions, or is that necessary?

The PRESIDENT. As I understand the matter, the committee has made a report offering a resolution recommending the adoption of a certain bill. I do not understand that the gentleman from Missouri [Mr. Switzler] offered this as a substitute, but that he read it as a matter of information. I am not sure of the precise situation.

Mr. SWITZLER. I see the difficulty that may be presented in keeping the records of the convention, and I therefore beg leave to offer it as a substitute for the resolution of the committee. It is a little more elaborate than that we have. It is in the same line of thought.

The PRESIDENT. Properly this would be an amendment to the report of the committee.

Mr. ATHERTON. I was going to make the suggestion as to whether that would not simply bring before us a still broader question, which would absorb time and attention, instead of confining our attention to the merits of the case. The committee has made a report which covers the points of the Cullen bill, and it occurs to me that if the colonel [Mr. Switzler] would be willing to let his proposed substitute stand as a part of his remarks on the resolution, as presented by the committee, that it would save time.

Mr. SWITZLER. I have no objection to that, except that I fear that some members of this body will vote against the report of the committee on this ground, that the report of the committee does not provide for those States which have experiment stations and no agricultural college, nor does the bill of Mr. Cullen.

Mr. KNAPP. I do not know that I understand the precise status of the resolution presented by the gentleman from Missouri, but, supposing that he intended it as an independent proposition, I was going to move its reference, so that the two could be harmonized; and I would offer one or two thoughts in favor of leaving the report of the committee as it is. I think all thoughtful men have long since agreed upon two questions: First, the necessity of accurate experimentation, in charge of trained men, to determine the important agricultural problems that now confront the people of this great producing country; and secondly, that it is impossible that that investigation should be carried on by private means. The difficulty has been, first, to settle upon a bill that should meet the support of all the friends of the measure; and secondly, to bring the proper information directly before Congress. If it could be properly presented to our members of Congress in some such form as our eloquent friend from Missouri [Mr. Switzler] has presented it here, and with something of the nerve and force with which he has so admirably presented it, it could not fail to meet the approval of that learned body. Now, in order to secure a bill that should meet the approval of the friends of the measure, it was necessary to have a very simple bill. It must necessarily leave out a great many details that this or that friend would be glad to have in. We were exceedingly fortunate in securing such a measure. It met the indorsement of the friends of the measure all over the country. When the Committee on Agriculture passed upon it they saw fit to modify it in some particulars. I think they have made some mistakes and I think they have made some improvements; but this, perhaps, is not the place to comment so much upon the mistakes and the improvements as reported by that committee and known as the Cullen bill, House of Representatives, 7498. It is a grand bill. It recognizes the principles for which we have been struggling. It will do an excellent work, and will it not be better for us to simply indorse this bill, which, as I have said, has met with such universal approval? It has been indorsed from California to Maine by all the strong working men in the cause of agriculture, and will it not be better to simply indorse it, and then when it comes before the proper committee, if there are some modifications to be made—as I think there are, as I think there ought to be, and so do not object at all to the modification suggested—will it not be better to discuss it in the proper place? It cannot have more value if presented and discussed here. So let us indorse this as it is, and then when it comes before the proper committee, present your views there, and if Congress can be made to see it as the presentor does, why very likely it will make a proper modification. Therefore, I should recommend that the resolution as reported by the committee be indorsed by this body.

Mr. SWITZLER. I apologize to the convention for again speaking a word about this, but upon an examination of the resolution reported by the committee I find I was in error as to its scope and tenor. It does not commit this body, if adopted, to the exact words of the Cullen bill, but it approves of the principles and general provisions of what is known as the Cullen bill. This being so, I do not offer my resolution as a substitute for the report of the committee I do not wish to complicate the affair at all, but offer my resolution, sir, as a part of the remarks which I made and for information, and I shall vote for the report of the committee.

The PRESIDENT. I would suggest that the secretary read that bill. Many of the delegates present want to know what it is that they are voting upon, and the secretary will read the bill if there be no objection. [After a pause.] The secretary will proceed.

The secretary proceeded to read a bill.

Mr. WILLITS (interposing). That is not the bill. The bill to which we refer is the Cullen bill and I wish that the secretary would state the effect of that bill. It was reported favorably by the Committee on Agriculture in the House of Representatives. They made an elaborate report, which is printed, and is really filled with information on the subject. It can be obtained I presume at the document-room of the House of Representatives.

The secretary then read the Cullen bill as follows:

A BILL to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That in order to aid the Department of Agriculture in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science, there shall be established, in connection with the college or colleges in each State established, or which may hereafter be established, in accordance with the provisions of an act approved July second, eighteen hundred and sixty-two, entitled "An act donating public lands to the several States and Territories which may provide colleges for the benefit of agricultural and the mechanic arts," or any of the supplements to said act, a department to be known and designated as an "agricultural experiment station:" *Provided,* That in any State in which two such colleges have been or may be so established the appropriation hereinafter made to such State shall be equally divided between such colleges, unless the legislature of such State shall otherwise direct.

SEC. 2. That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals: the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation within the isothermal limits represented by the climate of the several stations and their vicinity; the analysis of soils and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds: the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States.

SEC. 3. That the said experiment stations shall be under the direction and control of the trustees or other governing body of such colleges, who shall have power to appoint a director and such assistants as may in each case be necessary.

SEC. 4. That in order to secure, as far as practicable, uniformity of methods and results in the work of said stations, it shall be the duty of the United States Commissioner of Agriculture to determine annually a standard of valuation of the ingredients of commercial fertilizers, upon which the analysis of such fertilizers, as far as made by said stations, shall be based; to furnish forms, as far as practicable, for the tabulation of results of investigation or experiments; to indicate, from time to time, such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purposes of this act; but nothing herein contained shall be construed to authorize said Commissioner to control or direct the work or management of any such station except as to the standard of valuation of commercial fertilizers. It shall be the duty of each of said stations, annually, on or before the first day of February, to make to the governor of the State in which it is located a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said stations, to the said Commissioner of Agriculture, and to the Secretary of the Treasury of the United States.

SEC. 5. That in order to make the results of the work of said stations immediately useful, they shall publish at least once in every three months bulletins or reports of progress, one copy of which shall be sent to each newspaper in the States in which they are respectively located, and to such individuals actually engaged in farming as may request the same, and as far as the means of the station will permit. Such bulletins or reports and the annual reports of said stations shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster-General may from time to time prescribe.

SEC. 6. That for the purpose of paying the salaries and wages of the director and other employés of said stations, and the necessary expenses of conducting investigations and experiments and printing and distributing the results as hereinbefore prescribed, the sum of fifteen thousand dollars per annum is hereby appropriated to each State, to be paid in equal quarterly payments, on the first day of January, April, July, and October in each year, to the treasurer or other officer duly appointed by the aforesaid boards of trustees to receive the same, the first payment to be made on the first day of July, eighteen hundred and eighty-five; but no such payment shall be made to any station until the trustees or other governing body of the college at which such station is located shall have executed, under their corporate seal, and filed with the Secretary of the Treasury, an agreement to expend all moneys received under this act for the sole and exclusive purpose and in the manner herein directed, and to maintain a farm of at least twenty-five acres in connection with such college, and shall also have executed and filed with said Secretary their bond, in the penal sum of fifteen thousand dollars, with two sufficient sureties, approved by the clerk of a court of record in such State, conditioned on the faithful expenditure of and accounting for all moneys so received: *Provided, however,* That out of the first annual appropriation so received by any station an amount not exceeding one-fifth may be expended in the erection, enlargement, or repair of a building or buildings necessary for carrying on the work of such station; and thereafter an amount not exceeding five per centum of such annual appropriation may be so expended.

SEC. 7. That whenever it shall appear to the Secretary of the Treasury from the annual statement of receipts and expenditures of any of said stations that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding annual appropriation to such station, in order that the amount of money appropriated to any station shall not exceed the amount actually and necessarily required for its maintenance and support.

SEC. 8. That nothing in this act shall be construed to impair or modify the legal relation existing between any of the said colleges and the government of the States in which they are respectively located.

Mr. SMITH. Mr. President, as I said this morning, I looked forward to the assembling of this convention as an opportunity, and a rare one, of enabling the representatives of agricultural education to come together and agree upon some plan by which, as you remarked this morning, union and harmony and unity of action might be achieved. I thought, sir, that as you had undertaken to call a convention of the representative men of agricultural education from every section of this country that it was as little as we could do when we got together to have a full and free interchange of views. In what I may feel it a duty to say I do not expect to contribute anything of value to the deliberation of this convention in the discussions of which I will only be too glad to be an earnest listener and learner. I had, however, prepared some resolutions which I hoped to present at a proper time, but I find they have been in the main anticipated by those of the committee just reported and which are now before this body for consideration. At the suggestion of several gentlemen who favor my resolutions, perhaps beyond their real importance, I was tempted to ask that they either become a substitute for those of the committee or be permitted to supplement them, but after hearing the admirable resolutions of the gentleman from Missouri, Mr. Switzler, and his forcible remarks relating thereto, I am inclined to be content to follow his example, and instead of interfering with the resolutions of the committee, which are perhaps sufficiently comprehensive for our purposes, simply submit them for what they are worth as a part of the few remarks which I propose to make. They are as follows:

Whereas an enlightened agriculture is the basis of national wealth and greatness and of a high civilization; and whereas, as the agricultural products of the United States represent more labor and wealth than all of her other industries combined; and whereas the products of the soil constitute the most important and reliable source of revenue for the support of her government, both Federal and State, and the most valuable medium of commercial exchange, both foreign and domestic, as well as the most potent factor which she possesses for attracting wealth from foreign countries and of thus building up and increasing her greatness and usefulness; and whereas the wonderful development of agricultural science and of agricultural resources throughout the world has created a competition for agricultural supremacy which can only be met successfully or upon terms of equality by an enlightened agriculture and a skilled husbandry; and whereas to secure these blessings, expensive educational methods in the shape of experimental investigations combined with practical demonstrations are necessary; and whereas the utilization of these agencies are beyond individual achievement, and, besides, should be accomplished by the people at large, who will be its beneficiaries, through legislative action; and whereas the prosperity of agriculture is essential to that of all other industries, of which it is really the purveyor and motor; and whereas its benefits are shared alike by the Federal and State governments, making it unjust for either to expect the other to bear the whole burden of expense: Now, therefore, be it,

*Resolved,* That it is the sense of this convention, representing the agricultural educational interests of every section of this Union, that it is the duty of the National Government to extend liberal aid to the agricultural colleges of the United States and other kindred agencies for the purpose of securing for this country an enlightened agriculture and a skilled husbandry.

It will be observed these resolutions cover the same line of thought and purpose as those of the committee, only differing in phraseology. In this connection of Government aid I hope this convention will sanction in its entirety the Cullen bill reported by the committee. I have had occasion to examine carefully its features and to test the feelings of members of Congress as to its practicability, and I am satisfied it embraces what we need and what we will be able to obtain at the hand of Congress, with proper effort.

There is, however, something to be done besides adopting a resolution which favors the passage of a certain bill. I recall that last winter several of us representing colleges—presidents of colleges—met here with the view of endeavoring to get the Congress of the United States to pass that bill, and I am very glad indeed to see here, in person to day, several of those gentlemen. What we needed then and must have now was more unity of purpose and energy of action among the colleges. Too much was expected of a few earnest men whose willingness to work was more palpable than their ability to accomplish what was needed without essential co-operation. We must have intelligent, well directed purpose with the means adequate to achieve the results sought. We propose to ask only just and reasonable aid, but we must have some reliable person to represent us at Washington with the responsibility of the matter that it may not go by default. This will require a moderate expenditure of money, and this must be raised by contributions from the various colleges. In addition to this we can all lend our help, and by earnest concerted action show Congress that we not only need but deserve the aid we seek.

I have but one other point to touch upon, and that is with reference to farm experimental work, a line of thought suggested by the gentleman from Missouri, whose remarks I listened to with much pleasure. This involves the question, what is the true mission for the agricultural college farms? This should not be an open question, and yet, however general may be agreement *in theory* as to this matter among the colleges, *in practice* there is a wide difference. From my observations, inquiries, and what light I can obtain from the regular reports of the colleges, I doubt whether a stranger could detect any difference which would enable him to single out the college farm from the numerous others to which his attention had been called. I observed that the management of the college farms is about the same as the average of other farms, the same routine of cropping without any distinctive features being observable, unless here and there a commonplace experiment, which determined little, if anything, of value, entitled them to superior rank. Farmers are not generally disposed to recognize them as teachers, nor indeed to acknowledge the possession by them of anything which had a right to claim superiority or supremacy among agriculturists.

Should this be so? If not teachers, what are they? When I became president of the Maryland Agricultural College the main thing that seemed to be required of me to demonstrate my fitness for the position was my ability to have a model farm. So I went earnestly to work to establish such a farm. When, however, I had matured my plans and calculated the costs, the thought pressed upon me, what possible good would the farmers of Maryland derive from the fact that we had a model farm at the college. None whatever from this naked fact, except that it might prove that the president possessed skill as a farmer, and therefore the ability to teach others. That the president did possess this capacity was an important fact, but if this fact could only find its demonstration as applied to the college farm, then, to my mind, it possessed little if any value or utility to the farmers throughout the State. Why? Because unless all other farms in Maryland could be brought to the same high state of cultivation by the identical means employed at the college there would be nothing gained by this knowledge. But as like surroundings of soil, climate, and general conditions do not often exist as to adjoining farms, how much less would these conditions be apt to be found as to sections of country possessing well-marked diversity in all essential particulars? Therefore how few of the farmers throughout any given State could expect to be benefited much by the methods employed at their college, without the addition of independent, tedious, and expensive experiment to meet their own individual cases. And yet my ability to cultivate successfully the ordinary crops on the college farm, especially if I had outcropped my neighbors, was the main test to be applied as to my fitness for the position I held. How absurd! A little reflection taught me that to raise crops *as crops* was none of my duty; that the legitimate farm work of an agricultural college should be experimental, the profit, while not undesirable, to be secondary and incidental. The farm, instead of presenting the attractive appearance of the model farm (as popularly known), its fields and crops designed for the rotation or other system, with strained development, under competitive incentive, should, on the contrary, with its checkered plats, with peculiar cultivation, embracing many varieties of crops in all possible stages of growth and development, present so curious and unsightly an aspect as perhaps to cause the passing stranger to ask: What crazy man is the possessor of this place? In short, there would be no beauty in it to the average farmer.

Mr. STURTEVANT (*sotto voce*). That is so.

Mr. SMITH (continuing). I am glad to know that my distinguished friend, Dr. Sturtevant, agrees with me in this. Now, then, what are we to do? I answer, we have got to make this matter of agricultural education at our agricultural colleges popular and useful. If we cannot make our work useful, let us close up our institutions and admit that we are a failure and should not be further supported by the people. Now, so sure am I that we can make our own colleges useful, I am not at all afraid to announce this proposition. It is not a bold position to take at all from my point of view. The problem which we should endeavor to solve, is how to get the farmers of the country closer to the colleges and the colleges nearer to the farmers or the people. If we can only get the farmer to know that the college stands ready and anxious to help him to solve all his problems and perplexities in the field, to accompany him in his daily experience and aid him to remove this and that difficulty which have interfered to prevent remunerative results, we have made a long step in the right direction. Only let him see that the college is able to help him and our troubles are over. With him as our friend, our usefulness and prosperity are assured.

That I may not unnecessarily protract these remarks, I will read a part of a report which I had the honor to prepare for our board of trustees, and which was presented to the legislature of Maryland at its last session. It embraces all that I desire to say further upon this point:

Daniel Webster said "an enlightened agriculture is the basis of all national wealth." When our great statesman made this announcement, few outside of the great political economists of that day fully comprehended its meaning. But now every intelligent man recognizes its truth. Agriculture, generally unappreciated up to a comparatively recent period, has grown into a broad science, through which expert and educated husbandry has become the profit of the farmer, that outside of scientific methods being unremunerative and disastrous.

The universal experience of this country, as of Europe, shows that institutions for agricultural education, designed for the public use and benefit, cannot be made self-supporting but require governmental aid. This is because of the necessity for providing a liberal and expensive educational equipment in the shape of buildings, teachers, and scientific and mechanical appliances of every kind, and for conducting experimental work and investigations which must be in many particulars uncertain, and therefore expensive. Added to this, the rates for tuition, &c., are low and oftentimes unremunerative.

What, then, shall we ask the legislature to do? Permit me to make a suggestion. It is involved in the following propositions: First, agriculture being a science, those who pursue it as a vocation must be educated in its laws, in the nature of plant life and growth, in the knowledge of plant food, and the best mode of preserving the productive vigor of the soil in order to make it profitable and attractive to capital and labor. Second, in order to solve its problems which are embraced in its theoretical, experimental, and practical methods, the scope of its educational work should be broad and liberal. Third, this educational work should be two fold in its construction: (1) that conducted within the class rooms, under the prescribed curriculum, together with such practical experimental illustration as the cultivation of the farm would furnish to the students as a matter of instruction; (2) experimental work outside of the college walls, and among the practical farmers of the State, under the direction of the agricultural college.

Thus, under this twofold arrangement, you would have the professors and students within the college walls dealing with the laws and principles of agricultural science, and reducing them to applied and practical methods, for the use of the practical agriculturist. You would find them also ready to analyze soils and fertilizers, seeds and plants and minerals, and doing any other scientific work which could aid the farmer in his practical operations.

On the other hand, you would have the farmers in every county and section of the State solving, in practical field experiment, the problems which had only been determined in the laboratory and the formulas of the college. The college would thus have two classes of pupils, the students within the college, and the farmers without the college. I suggest that these two classes shall come together once or twice a year at the college and confer as to what each had done for the other and what both had done for their State and the cause of agriculture generally.

These outside experiments would have to be made by selected representative farmers in every section of the State, say four in each county, who would be supplied by the college with seeds, plants, &c. It will be readily seen that in this way results will be speedily developed, which, in the ordinary mode, it would take several generations to achieve.

Lastly, I deem it of the highest importance that the State should educate a certain number of students annually, say at least one from each senatorial and legislative district. By creating this number of scholarships, and requiring all applicants to take the thorough agricultural course, the State would to this extent certainly secure an educated agricultural class and element which would annually leave the college to dispense its knowledge in every county and section of the State, and should become valuable to their agricultural clubs. These scholarships, being the gift of the State, would possess a value and dignity which would make them sought after by good men, and thus furnish a reliable and permanent foundation upon which to build in point of numbers and discipline a prosperous and useful educational work at the college.

Thus you have my idea of what should be the aim and scope of the educational work of a college designed to benefit the farmers. The present methods are too much localized. Theoretical and scientific instruction can be done anywhere equally well, and with some qualifications the same may be said of experimental work under glass. But when you come to field experiments and practical farming, no one locality possesses the variety of conditions of soil, climate, and oftentimes of peculiar surroundings which would make its experiments valuable as infallible guides and conclusions to farmers in every section of the State. We might make the college farm a model of agricultural productiveness and beauty, and we might understand how usefully instructive to the students the scientific facts and methods employed to accomplish all this had been. But does it prove that every farmer in the State could realize the same results by using the same fertilizers and the same cultivation which we had used? Surely not. Our experience would aid them greatly, but to produce identically the same results, identically like conditions and surroundings must exist. In proof of this, there are sections of this State where ammoniated phosphates are not needed at all. I think, for instance, the leading farmers of Talbot County have discovered this and use only dissolved South Carolina rock. The plan I suggest will speedily settle this and other important questions, by general and varied experiment, and thus save many dollars to the farmers.

Let us then have experimental as well as theoretical work at the college. Let us store the student's brain with scientific facts, and thoroughly develop the productive capacity of the college farm by scientific and skilled methods. But let us at the same time broaden our field of educational work by offering its instruction to every agricultural home in Maryland, and thus make the agricultural college not only and solely an isolated professor and preceptor, but a brother co-worker with the practical farmers of the State in working out the great problems upon which depend the prosperity and happiness of our people.

The establishment at the colleges of Signal Service stations (suggested by the Commissioner) for meteorological observations for the benefit of agriculture is a very valuable suggestion, as also the establishment at the National Capital of an experimental station and a repository where the agricultural products of the world may find exposition side by side. These, with their kindred agencies, will enrich the science and the vocabulary of agriculture and thus benefit agriculture generally. But the main object of my remarks has been to energize more thoroughly the agricultural college agency for aiding the farmer in his *individual*, and, it may be, his peculiar, agricultural surroundings. His needs are *eminently personal.* He demands that the developments of his science shall teach him how to achieve the greatest production possible for the least expenditure of labor and money without the impoverishment of his land, but rather by increasing its fertility. He naturally expects his agricultural college to aid him in the solution of this problem, and I think it is not an unreasonable demand. The college must meet this demand. It can do it. Farmers are beginning to discover and acknowledge this fact. They are recognizing that the prosperity of their industry rests upon a well-defined and broad science, and they are fast yielding to the importance of its liberal education that there may be an enlightened agriculture and a skilled husbandry to the end that agricultural labor may be remunerative and its products profitable. We are then masters of the situation if we are true to ourselves. Let us then work in the direction of the practical as well as the scientific and theoretical.

Mr. Armsby. It seems to me desirable that, in expressing the opinion of the convention, we should not simply give an affirmative vote upon this question, but that this opinion should carry the weight of the names of the members of the convention. We have here, as members, men of eminence from all parts of the country, and I therefore move you, sir, that when the vote is taken upon the pending resolution the roll of the convention be called, so that the vote can be taken by yeas and nays, and that the secretary enter upon the record of the convention the record of the vote.

This motion passed unanimously.

Mr. Cook. I only wish to say a word, sir, in regard to the way this bill was received by the Committee on Agriculture. I think that all the gentlemen connected with the experiment stations will be interested in it. The bill came up in Congress and was referred to the Committee on Agriculture. That committee consisted of seventeen members of the House, and I can say for it, sir, it was one of the best committees I ever appeared before, so far as the order and attention which they gave to business that was before them was concerned. When this bill came up they received it with indifference; they really did not seem to think it was of any consequence whatever, and there were a number of us that appeared before that committee and explained to them the object of the bill. President Atherton, my friend on my right, was one of them; President Field, of Columbus, Ohio, was another; Professor Brewer, from the Sheffield Agricultural School, was another. I think it was two months that they had it under consideration, sir, before they came to a conclusion, but the subject grew upon them, and finally, when they came to a vote upon it, they said the vote was unanimous; that it was the bill that was desired and was necessary for the country; and they were all ready to advocate it in the House whenever it could be brought up. But when the time came for bringing it up the difficulty was to get it before the House. There was no difficulty in counting votes enough in Congress to pass it if they could only bring it to the attention of the members, but they had such a pressure of business at the end of the session they could not accomplish it. We were assured by the chairman of that committee that he was ready to introduce it at the beginning of the next session of Congress, and as he is again elected as a member, I am confident from his position and the action he has taken in regard to it, that he is ready to take that action when the time comes.

A DELEGATE. Let the resolution be reported again, sir.

The secretary again read the resolution of the committee, as follows:

*Resolved,* That the condition and progress of American agriculture require national aid for the investigation and experimentation in the several States and Territories, and, therefore, this convention approves the principles and general provisions of what is known as the Cullen bill of the last Congress, and urges upon the next Congress the passage of this or a similar act.

The question was taken; and there were 55 yeas and no nays, as follows:

*Yeas*—Atherton, Armstrong, Armsby, Alvord, Blanpied, Burrus, Curtis, G. W., Cook, Chamberlin, Collièr, Dodge, J. R., Dabney, Dinwiddie, Dwinelle, Egleston, Fernald, Fairchild, Gœssman, Gold, Harrison, Henshall, Johnstone, Johnson, Knapp, S. A., Knapp, H., King, Lee, Lemmon, J. G., Lemmon, Mrs. J. G., Ledoux, Lazenby, McGeehe, McMurtrie, Newmann, Piolette, Phares, Patterson, J. K., Patterson, W. K., Peabody, Riley, Smith, Sanborn, Switzler, Scott, Spurr, Townshend, Thorne, Taylor, Tamari, Vasey, Whitman, Wing, Willits, Woodhull, Wiley.

*Nays*—None.

Mr. HARRISON. My name was not called. I beg leave to vote "ay," and to have my name recorded.

The PRESIDENT *pro tempore* (Mr. SWITZLER). All the delegates present have voted in favor of the resolution, and the resolution is unanimously agreed to.

Mr. ALVORD. The committee on the order of business reports, for the purpose of aiding in carrying the vote just taken by the convention into effect, as well as to aid subsequent action of the convention, the following:

*Resolved,* That before final adjournment there be appointed by the chair a committee of three, whose duty it shall be as the representative of, and in the name of, this convention, to co-operate with the Commissioner of Agriculture in endeavoring to secure such legislation by Congress as may be reported by this convention, and that this committee be authorized to add to its membership at discretion in connection with any particular measure before Congress.

Mr. SANBORN. The report of the committee comes very nearly to a resolution which I had previously drawn up, but it does not cover one point:

*Resolved,* That the Hon. N. J. Colman, Commissioner of Agriculture, be requested to present this resolution to the Committee on Agriculture of the next session of Congress and use his influence to secure the passage of the bill, also that a committee of one from each State be appointed by the chair to secure petitions to aid the passage of the bill, and also that the committee be further requested to secure the favorable vote of their several State legislatures.

I make it thus broad, because I have learned that such resolutions amount to but little in securing action, particularly resolutions of agricultural organizations. It is action that counts: it is action that we want.

Mr. SMITH. I would suggest simply that you include the Commissioner of Agriculture with the others as a member of the committee to adopt a method of bringing it before Congress, and to take such action as they may see fit for the purpose.

Mr. SANBORN. I think, Mr. Chairman, that one member from each State should be designated, so that individual responsibility falls upon him for any action which may be taken in his State. If we spread it around among a dozen it loses force. I want one strong man for each State to be responsible.

Mr. SMITH. You make it the duty of the Commissioner of Agriculture to do the work before Congress, as I understand you to say, and then afterwards you appoint these others. Will you please read the resolution again?

Mr. Sanborn again read the resolution.

Mr. WILLITS. I do not think that that substitute ought to pass, at least in its present form. I have no objection to the Commissioner of Agriculture being associated with sundry parties to press this legislation before Congress, but he should not be the sole one to do it, and I will state why. This is not the only matter that the Commissioner is interested in. You load him up with sundry matters and you scatter his influence all over; you diminish his influence; you embarrass him. Now your committee should be a small committee; not a committee of thirty-eight from the different States or forty-seven from the States and Territories; that is so large a number that it will not be efficient at all before the Committees of Agriculture of Congress. Appoint an active committee to co-operate with him, and upon which you may put the onus of the argument and the presentation and the following up of the measure through the session to prevent any pigeonholing, if you choose to use that word. I think the resolution as presented by the committee is practical. I would be willing to have a resolution, in accordance with Mr. Sanborn's idea, so that there should be a gentleman from each State and Territory who shall work up the influence in his own State or Territory; but the efficient agent of this association should be a small committee, and one which should have an eye single to the one purpose of passing that resolution, because this whole theory, as I understand it, is the uniting of all these associations in and through the Commissioner of Agriculture, and that is what commends it to my mind.

I will say this: that bill is weak in one respect: there should be incorporated into that bill an appropriation of $5,000 to be given to the Commissioner of Agriculture to select—if he cannot do it himself—to select some good man, or two men, to consolidate these reports and arrange them so that we can send them out through the country. Let him have $5,000 to select a brainy man who can take charge of the whole matter; a man who can consolidate; a man who can reason; a man of genius, who can draw conclusions from these reports, and can say annually what failures and successes have been made. We should co-operate with the Commissioner, but the committee which comes up here with a view to passing this bill through the House of Representatives and the Senate, should be a small committee, with nothing else on its hands and no other embarrassing questions before it. If you choose, the suggestion made by Mr. Sanborn that a committee of one from each State to work up the sentiment of the farmers of his locality, might also be made.

Mr. SANBORN. If the gentleman wishes to add something like this: The Commissioner of Agriculture and three members appointed by the chair——

A DELEGATE. Mr. Chairman, I want to make this suggestion: That each member of that committee be pledged beforehand to do the work; let us have men that we can depend upon, as far as it is possible to depend upon any one; men who are pledged that they shall go and do the work, and who will give the time which is necessary to accomplish it.

Mr. LE DOUX. I think the difficulty perhaps would be obviated if the committee would allow their resolution to be amended so that the committee will have power to add to their number——

Mr. ALVORD. That is provided in the resolution.

Mr. LE DOUX. I beg pardon, then; I was not aware of that.

Mr. ALVORD. Before the question is put, allow me to call the attention of the chair and of the convention to these few words toward the close of the resolution: First, it provides that before final adjournment a committee of three shall be appointed—a small working committee; second, it provides that this committee shall labor in connection with the Commissioner of Agriculture. So far, it seems to me, it agrees pretty well with the gentleman from Missouri (Mr. Sanborn). Third, it provides that this committee shall be authorized to add to its number—a provision that is seriously intended to authorize the committee to send to a professor of agriculture and say to him, "We depend upon you." And the committee might in the same way appeal to one good man in every State to aid in its work. It seems to me that this resolution, which was carefully considered by the committee before it was framed, provides as well as it could for all these things and covers exactly the ground that the gentleman from Missouri (Mr. Sanborn) desires to have covered.

Mr. SANBORN. I would say that I weighed carefully the words of the committee, and thought that there was a weak point there. I believe that there is a desire to make this work conclusive, and that one gentleman from each State should take this work in charge—an active, vigorous man—and with influence among the agricultural public for whom he is at work, he should so organize the agricultural associations of his State as to bring a positive expression to bear upon the delegation of his State. Not that I would seek any coercion; that was the farthest thing from my thought. My own experience in such matters is that we, as a body of men, are about to act upon a simple resolution, all right enough in itself, but very innocent of any effective purpose, and I thought it was our duty to see that the resolution was so far perfected as to provide that some one should be responsible for the organization of this force. I know, sir, the farmers are quite ready to co-operate in this matter, and, if the question is brought to their attention, that they will be willing to make known to their delegation in Congress and to their State legislature that they are in favor of this bill, and that is all our Congressmen want to know. They are not inclined on their part to be engineers in this matter. My own experience, if you will allow me to express it publicly and freely, is that professional gentlemen everywhere on all occasions have been the first and most ready, and have taken the broadest views in every new movement in agriculture; all we have to do is to present our views intelligently to them and they will give them vitality. I do think that some one man of each State should become responsible for this matter, and if it is agreeable to the committee I will make a motion to amend that section wherein it says they have power to extend the number, by providing that they shall appoint a member from each State.

Mr. ARMSBY. If the gentleman from Missouri will allow me to suggest that he withdraw his motion for the present and allow us to vote upon the proposition of the committee, and then bring up his proposition as a separate matter, it will save time and prevent confusion.

The amendment was lost.

The resolution as reported by the committee was then adopted.

Mr. ALVORD. The committee, without offering any resolution, desire to suggest that there are papers prepared by gentlemen present for reading before this convention, and the committee therefore suggests that if the convention so desire it will be well enough to determine whether or no there shall be an evening session, recommending, however, that, if an evening session is decided upon, it be only for the reading of papers prepared. The committee will also state, for information, that if it is decided to have these papers, the first one to be read, they recommend, be that prepared by President Willits on industrial education. That being settled, if it is to be, there will yet be time for the consideration of one other topic upon which the committee is ready to report.

Mr. CURTIS, of Texas. Mr. President, what is the question?

The PRESIDENT *pro tempore*. I do not see that there is anything before the convention. Does the committee present a proposition?

Mr. ALVORD. It was merely a suggestion.

The PRESIDENT *pro tempore*. There is nothing for us to act upon, then.

Mr. ALVORD. The committee will then formally report in favor of an evening session for the reading of papers only.

Mr. CURTIS, of Texas. I did not understand that the committee was putting this in the form of a motion, and I simply rose to make a motion myself that we meet this evening, and I am ready to vote on that motion.

The motion was agreed to.

Mr. CURTIS, of Texas. I move that when we adjourn it be until 8.30 o'clock.

The PRESIDENT *pro tempore.* In the absence of objection it will be so ordered.

There was no objection.

Mr. ALVORD. The following resolution is the last subject upon which the committee is ready to report this afternoon:

*Resolved*, That the plan of the Commissioner of Agriculture to introduce upon the farm connected with agricultural colleges and experiment stations the more valuable plants and trees adapted to local climatic conditions from the various parts of the world, in order to diversify our agricultural products, meets with the hearty approval of this convention.

Mr. DWINELLE. Mr. Chairman and gentlemen of the convention, perhaps it seems a little ungracious in me to offer the slightest opposition to this proposition, just as it comes. I wish first to say that I am one of those who most strongly appreciate every assistance in this sort of work. My own State, California, has been vastly benefited by past dealings with the Department of Agriculture. As an instance of this, we received out there the Odessa wheat, which has put an immense valuation on the richest and finest lands of the State, that were otherwise useless, because grain rusted as a general thing, and people were unable to use those fine lands for grain raising—wheat raising. A certain orange was also——

Mr. WILLITS (interposing). By whom was that wheat introduced? How came it to be introduced there?

Mr. DWINELLE. That wheat was introduced by the Department of Agriculture. I want to bear a little testimony to the value of this sort of an introduction. This wheat was introduced in the usual way through the Department of Agriculture. It was sent to some one because he was a political friend, I presume, and it laid on his counter for some time. It was not white, nor plump, nor handsome, and nothing was known about it. Finally some one took it home, and out of a joke planted it, and the result was that it did not rust; and that has been the turning-point in the wheat raising there from Santa Barbara south to the Mexican line and in back of the former belt. Then I want to say that somebody sent one orange tree to a lady at Riverside. It was called the Bahia. Now it goes by the name of the Riverside Navel orange. We had a similar fruit brought from Australia, and because of this it was not considered especially valuable; still some one used the buds, because they could get them easily, I suppose, and that has proved to be of the greatest value, and ranks to-day among the finer oranges of the coast. We had reason to appreciate these things, for we are to-day beginning to supply this coast with its fine oranges—let me be a little modest, and not say its very finest. So much for what this Department has done. Those two instances, let me say, are worth a hundred thousand dollars to California every year. I suppose in neither case did it cost $5 at the outside to make the introduction, and in one case probably not more than 25 cents. This introduction I approve of. I hope you may continue to get these things from foreign shores if we can have them without their own particular pests which exist on those shores. Now the Department of Agriculture, I am sorry to say, has sent us I don't know how many kinds of injurious blights, mildews, and rusts, which we had to take along with the benefit which we derived from these distributions. Of course individuals have brought us these things, too, but I say the Department of Agriculture because I know one particular case within two years where seed, which had been sent there and which turned up before the board of horticulture, was found to contain a very fine specimen of a new kind of weevil. So it goes. I know of another case of the introduction of lemon trees there at considerable expense. They were planted out at Santa Barbara and developed a new kind of scale bug, and of course proved to be utterly worthless. Another gentleman imported a Navel orange into San Gabriel, Los Angeles County, and it developed an insect that will cost them tens of thousands of dollars before they will be clear of it. Now, I want to call attention to the importance of the most careful examination on the part of the Department of Agriculture of all importations of seeds and plants as to insect pests and fungus diseases. In California, I want to say, my connection with the university for several years has been mainly, aside from instructions, devoted to studying these new things, and in rendering efforts to exterminate the pests. We have enough now, and can get along very well if you gentlemen do not send us another one. We want Professor Riley and the other agents to examine carefully and investigate thoroughly everything that is imported before it comes off ship-board. I have written some things and bored some gentlemen here by sending pamphlets on these subjects for several years. I must say that one discouraging thing in California to-day is our fight with some of the pests that have been introduced in these importations. Our State board of agriculture one year invited you gentlemen to send us apples, and I suppose the best you could do was to send us the real wormy ones, for that is what you did, and they were contemptible worms at that. The secretary believed that the apples should be destroyed then and there, but a member of the board wanted them to take over to compare with some of his own. Those apples were taken across the Sacramento River, where his comparison was made. After this he sent Patrick to destroy them.

Pat. felt a little lazy and dumped them under the shed, and the coddling moth got out and made its nest on the apple house or shed, and the next year they were carried up and down the river, and to-day, gentlemen, in four-fifths of the apple-producing parts of California, from 50 to 90 per cent. of the apples are affected by this worm every year, and all from that apple which was unfortunately taken for comparative purposes; and when I reflect that all this difficulty and loss of money could have been avoided, perhaps, it makes me feel like urging the importance of a thorough investigation upon the officials of the Department.

Mr. WILLITS. I am very glad of the opportunity of adding emphasis, if I can, to the credit which Professor Dwinelle has given to the Department of Agriculture. I felt last evening while we were talking on the subject of the distribution of seeds that we should look into the history of this question of distribution—reckless distribution, if you choose to call it so—but the distribution of seeds themselves, that has tenfold paid the cost of the institution to the United States. Now you take the question of wheat accidentally started in the State of California, or the question of the orange about which you have heard, and we find them to have been of more benefit to the Pacific coast than this whole Department has cost the Government since its establishment.

I came in 1877 to the House of Representatives, representing a district from the State of Michigan, with a prejudice against this institution. I thought it was nothing better than a pumpkin-seed department. By some means or other I heard of that Odessa wheat. I procured and distributed what seed I could. There were also at the time the Norway and other oats to be distributed. The result of that distribution has increased the yield 10 bushels to the acre in my own State and all over the North and Northwest; and therefore I say, as I said before, whatever may have been the manner of the distribution of the seeds which emanate from this Department, in however reckless and slip-shod a fashion they may have been distributed, they have tenfold paid the cost of the Department. Therefore I must emphatically indorse this question of the distribution of seed. In a former administration of the Department we had a strange experience. The then Commissioner desired to change the method of distribution. I believed that he was right, and I stood by him in that matter because I believed he was right. In the first place he wished to buy the very best seed, and he desired after he obtained the seed, to send it to the leading farmers in each State. He desired to send a bushel, a sufficient quantity to pay for making an experiment, and he did not believe in distributing by pint measure and pound weight; but he was finally forced to accept a compromise of having one-fourth of the seeds to himself, while three-fourths went to members of Congress. What was the result? You take the question of cotton-seed to which the present Commissioner in his admirable paper has referred. The effect of this compromise was that Congressmen from the State of Michigan had cotton-seed. What did they do with it? They peddled it off and traded it with their Southern brethren for something else. There was no discretion on the part of the Department, and as much went to Michigan and Maine as to South Carolina and Georgia. The method should be amended in this respect, or else the fund should be large enough, and I do not care how large it is, so that Congress may have what it wants, and the Department have sufficient left to make such a distribution as it sees fit. There is no doubt in my mind that if properly organized, properly administered, this matter of seed distribution can be made of vast benefit to the United States. Now, one thing in reference to these pests the gentleman has referred to, the distribution of which has been charged upon the Department of Agriculture. Gentlemen must remember that pests are bound to scatter themselves. I recall some years ago when I went up into the Mackinaw district the people there had never seen or been troubled with the potato bug. Two years after that I went up there again and potato bugs were plenty. The trouble is that you cannot keep these pests out; but I do subscribe to the suggestions that have been made that the Commissioner, through his entomologists and botanists and other scientists, shall carefully inspect everything that they receive and distribute. This is well enough as a precaution, but this Department cannot be held responsible for the introduction of the pests, for pests will travel.

Mr. KNAPP. I do not desire to make any modification of the resolution as presented, but for one I cannot see any great good in the present method of distributing seeds. I have no doubt that some good things have been accomplished. I am cognizant of a few; but when the whole be measured by counting the costs of purchase, of transportation, of injurious insects, and of foul seed, I think the balance would vastly be on the wrong side of the ledger. In our country, the intelligent part of the population regard this distribution as a stupendous outrage—[applause] we might just as well use plain language because I am not under the same restriction as our Commissioner of Agriculture is; in order to keep peace with Congressmen I am not obliged to submit to a wrong. Now, some one must say plain things to these Congressmen, and they must say practically that the intelligent citizens of this country cannot so stultify themselves as to have peace made between themselves and Congressmen by the distribution of a penny's worth of foul seed. Our good friend, Mr. Townshend, of Ohio, tells me that in a single package of seed sent by a Congressman there were twenty-three varieties of foul seed, and there was one variety that they were a little uncertain about. They *are* certain that they had a preponderance of evil, and it is this that is working an everlasting wrong, scattered as it is all over this great country. Almost universally, upon our Western prairies, when we have tested a particular variety of wheat or corn, or of any other seed after several years of careful investigation and have said in the public prints and privately and everywhere that it was an injury, about the next season you may expect the whole State to be deluged with that particular variety. Now, if that is to be carried on and tolerated because Congressmen suppose that we can be petted in that kind of way it seems to me that it is an insult to the intelligent American farmer; therefore I would be glad to have a special fund appropriated by the Congress of the United States, placed under the control of the Commissioner of Agriculture, to be managed in accordance with his intelligent suggestions, that rare and valuable seed should be tested in the various localities for which they are designed, to see whether that class of seed is valuable; and, when valuable, to see that it is free from foul seed or injurious insects. The people will approve of that kind of legislation for seed for distribution to them; and let it be distinctly understood that the other class belong to the Congressmen for their distribution, and that no opprobrium should be cast on this Department because of such actions on the part of——

Mr. WILLITS. May I ask the gentleman a question?

Mr. KNAPP. Certainly.

Mr. WILLITS. Very well. Now, when they find out that the Department is distributing a better seed than they get, don't you suppose that they would cut the Commissioner's head right off?

Mr. KNAPP. I have said that the Commissioner of Agriculture must do the best he can. He should have the benefit of this special fund, and while Congress would be willing that good seeds shall be furnished, yet they want common seeds for universal distribution. And I suppose that they will take those seeds that are not at all adapted to our country and send them out. I can name several cases where such have been sent out to the great detriment of our State. Now, I would be glad to have the Commissioner provided with a sum of not less than $50,000 annually for the purpose of distributing new and valuable seeds, and if that fund was placed under his charge he could then make his investigations as to where in the several localities the seeds are best adapted.

Mr. STURTEVANT. I would suggest a way out of this difficulty by reading the law under which the Commissioner buys and distributes seeds. I think the reading of that law will unravel the whole difficulty. It states there what the Commissioner can do. If he follows that law, which he can do, there can be no objection to it. One thing, of which complaint is made, is where the Commissioner has gone counter to the law.

Mr. DABNEY. I am glad that the subject has been brought up, and I think it will be well for this convention to give expression to its opinion upon it. It will help our Commissioner, who, I am sure, is with us in our opinion upon this matter. Since the subject has been brought up, I offer, as an addition to the resolution at present before the convention, the following:

> That the ordinary distribution of common and untested garden and farm seeds to untrained persons, or persons who from the nature of the case cannot use them for the purpose of experimentation, is illegal, useless, and injurious.

I offer this as an amendment to the resolution now before the convention, and I have endeavored to construct the phraseology so as to give us all we want, and exclude all that we do not want to have disseminated throughout the country. We want the Odessa wheat; we want the orange and everything that proved so successful in California, and we want to try all the experiments with new and valuable plants and seeds which can be brought into this country, and which prove upon investigation to be free from pests; but I hold that the distribution of common seeds to untrained persons, unqualified to make any experiments with them or to report any result intelligently, is illegal, useless, and injurious.

I am glad that Dr. Sturtevant has called your attention to the law upon this subject. I have been thinking about it and have a document here which I will take the liberty of referring to:

I read from the Revised Statutes. Section 520—the first section of the title "Department of Agriculture"—has the following words among the duties of this Department: "To procure, propagate, and distribute among the people new and valuable seed and plants." Again, in section 526, "he shall collect"—speaking of the Commissioner of Agriculture—"he shall collect new and valuable seeds and plants; shall test by cultivation the value of such of them as may require such test; shall propagate such as may be worthy of propagation, and shall distribute them among agriculturists." It is perfectly clear, I think, that the seeds were to be tested here at this Department before they were to be distributed. Section 527 says:

> The purchases and distribution of seeds by the Department of Agriculture shall be confined to such seed as are rare and uncommon to the country, or such as can be made more profitable by frequent changes from one part of our own country to another; and the purchase, propagation and distribution of trees, plants, shrubs, vines, and cuttings shall be confined to such as are adapted to general cultivation and to promote the general interest of horticulture and agriculture throughout the United States.

Now it appears to me, gentlemen, that, pushed by the wants of Congressmen, the Department of Agriculture has departed from the organic law in years passed, and that it is a most opportune occasion just now to put ourselves on record on this subject and give a clear, distinct, and unqualified expression of opinion; and it is our good fortune and our pleasure to know that the present Commissioner of Agriculture is with us in these opinions, and will aid all he can, consistently with the interests and necessities of his position, to carry out these views, which were his as early, if not earlier, than they were ours.

I am not here to relate any of the old stories about the abuses in this seed distribution. I am not going to tell you how one Congressman sent two barrels of potatoes to a poor kinsman to be used upon his table, or how another one sent the oats that were given to him home to feed his horses. These things may be true or may not be true, but the whole country knows that this business of seed distribution has been greatly abused, and I hope, therefore, that this addition to the resolution, or the same expression of opinion in some other shape, will be passed to put this meeting on record.

Mr. WILLITS. The gentleman seems to speak *ex cathedra* on the question of illegality, and thereby he arraigns both houses of Congress and all the Commissioners that have preceded the present one; yet in the very last section that he read, he seems to answer his own charge of illegality. You cannot name a single purchase that has been made by a Commissioner which is not based upon the allegation that the seed that he has purchased was either new or valuable or that it was good and fit to be tested in another section of the country. For instance, you take the Minnesota sorghum seed. There was no question about it; they raised a quality of sorghum that by transporting and transplanting to Michigan raised the value of the sorghum crop of that State 25 per cent., and but for the matter that sugar has become so marvelously cheap, by reason of competition, the sorghum question would be an abiding question with us. I merely use that as an illustration. You take wheat from the State of Michigan and plant it in Illinois, or perhaps in Missouri, although Missouri leads in the kind of wheat she raises, still it is barely possible that the quality of wheat that is successful in Michigan would be a much greater success in Missouri. We don't know about that; that is an experiment, and that last section read by the gentleman gives the authority to purchase as they have purchased. Perhaps they have not been as diligent and practical in the exercise of their judgment as they ought to have been, but to say that they have acted illegally is more than I am prepared to do.

Mr. LEE. Mr. Chairman, I doubt very much the propriety of the resolution introduced by my friend from North Carolina. We are here in the attitude of asking favors from Congress and I do not think it is a legitimate discussion to arraign Congress for improprieties or supposed improprieties it may have committed. We hope that abuses will be corrected as they occur in the future, and I think the proper attitude for us to go to Congress is not to arraign it in any way as to their methods of appropriating money for the seeds; and I think that all that we can do is to ask Congress to give us an additional appropriation to be placed in the hands of the Commissioner to use as he may see proper.

Mr. TAYLOR. I propose to make a few remarks in regard to the insects in seeds as distributed by this Department, and to state some facts which show the impossibility of sending out seeds at all times which are absolutely free. They do to-day just what has been done heretofore in some seasons of the year. Some practical change might perhaps be made which would prevent this.

On one occasion we gave $60 for one bushel of sorghum seed of a very valuable, rare variety. In a short time afterwards it was placed in a warm place and one of the messengers in the Department observed a sort of a buzzing sound around that bag. He called my attention to the bag and I found that it was full of beetles, or creatures probably of the beetle character. Now here was an astonishing price given for a weevil, and an astonishing price for the seed to feed the weevil with, unknown to the persons who made the purchase. This same thing may occur again, Mr. President. If the Government should give you $50,000 for the purpose of purchasing seeds or rare plants from hot countries or cold countries, although they be purchased by brainy men, notwithstanding the superior intelligence displayed in their selection, just in the transportation of that seed in the holds of the vessel, there would begin at once the development of the very insects that we are endeavoring to keep out.

Is there any remedy? I think there is a remedy.

If we get seeds in this place, say in Canada or in various other places, and we purchase them in the cold seasons, all done with the best of purposes, and we pay these astonishing prices for them, you will have the same results that the gentleman from California has told you of. Now, before the purchase of this sorghum seed, I had been making some experiments with naphthaline. I made a great many, and I read a paper on this subject before the Biological Society of this city. I showed in that paper very plainly that in my experiments with this sack of weevils, with a few ounces of naphthaline placed in the center of that bushel, in a short time the humming noise ceased, and in another short time it was found that the insects were all dead. A large quantity of peas that were purchased were found also to be full of that same sort of insect. I took a gallon of them and placed a small portion of naphthaline in the jar and closed them up, and in a very short time every one of them was seen to roll on their backs, dead.

Some insects are affected instantly; for instance, the winged termite will give a shrug of its shoulder and off goes the right wing. He does the same with his left wing. They are very susceptible to the odor. I recommended also in this paper that in sending packages of seeds to this country a few grains of this substance should be placed in each box in order to destroy the insects, for the eggs are frequently in the seed and this cannot be told by any man in advance; and should they hatch in the mean time the odor will destroy them.

With regard to certain seeds in their power of resisting mildew, it has been found that the common potato, the Irish potato, will resist mildew provided you plant the very early varieties or the very late varieties. The agricultural societies of England have recommended that the farmers plant hereafter very early and very late varieties for this purpose. It is found that the growth of the fungus depends upon the very peculiar character of the fluid in the plants themselves. If the fluid is of a suitable character to give vitality and carry on the processes of life in these minute fungi they will grow, but if you can retard the growth of the plant during the heated term, so that the plant fluid favorable to the growth of the potato fungus will not have matured until after the heated term and other unfavorable conditions are over, the potato fungus (*peronospore infestans*) will not mature and the potato will be safe. In the latter case the potato grows to its maturity, because the atmospheric conditions late in the season are unfavorable to the growth of the fungus.

Mr. DABNEY. In reply to the gentleman I would say that he scarcely understands my resolution. I called his attention more especially to the words "common garden and farm seeds" to "untrained persons or persons who cannot use them judiciously for the purpose of experimentation."

The law, as I understand it, and as gentlemen present understand it, evidently contemplates that all new and useful seeds shall be first tested by the Department. I put in the word illegal, first, because seed of common varieties are distributed, and secondly, because the seed are not always tested before they are distributed. I do not blame Congress; I do not intend to blame anybody. The law is very plain, and I think I have interpreted it correctly, and if it is not as a large part of the gentlemen present understand it, then I wish to be corrected. I feel deeply in earnest in this matter, but I am perfectly willing to add some other adjective. If the word "illegal" is improperly used I should like to put in the word "wasteful" or "extravagant."

The PRESIDENT. The question is on agreeing to the amendment. [After putting the motion.] The noes seem to have it.

A division was called for, and the amendment was rejected.

The PRESIDENT. The question now recurs on the resolution as originally offered.

Mr. PEABODY. I would like to have the resolution read.

The PRESIDENT. The secretary will again report the resolution.

The resolution was read and adopted.

Mr. ALVORD. I move that we adjourn until half-past 8 o'clock.

The PRESIDENT. Before we adjourn I wish to announce the following gentlemen as vice-presidents: Messrs. Willits, of Michigan; Lee, of Mississippi; Atherton, of Pennsylvania; Fairchild, of Kansas; and Dwinelle, of California, as vice-presidents of this association. [Applause.]

Mr. JOHNSTONE. I wish before we adjourn to offer a resolution, have it read by the secretary, and referred to the committee on resolutions without debate.

The secretary read the resolution, as follows:

Whereas a considerable number of appointments from civil life are annually made in the Army; and

Whereas the organic law of 1862 under which agricultural colleges are established requires that military tactics shall form an integral part of the instruction given in such colleges: Therefore,

*Resolved*, That the purpose of the law requiring military instruction will be materially served by making the appointments required for the military service of the United States as far as practicable from the graduates of institutions where army officers are by law in charge of military departments who shall have completed therein the required course of military instruction and training.

*Resolved*, That the foregoing preamble and resolution be respectfully submitted to the honorable Secretary of War and the President of the United States.

The PRESIDENT. The resolution will be referred to the committee on resolutions. It will save some trouble if those who have prepared resolutions and have submitted them to this convention will hand a copy of those resolutions to the secretary.

Mr. TAYLOR. A number of gentlemen seem to think that half-past 8 is too late to meet this evening. In this city that hour means 9 o'clock, and there are two papers I understand to be presented at this evening's session.

Mr. ALVORD. I move that we adjourn until 8 o'clock this evening.

The motion was agreed to and then (at 5 o'clock and 15 minutes), the Convention adjourned.

## EVENING SESSION.

The Convention met at 8.30, Mr. Lee, of Mississippi, in the chair.

Mr. ALVORD. Mr. President, as the committee has no formal report of any business to be considered this evening, it may be well enough for the committee to state what its conclusions have been so far on the order of business. This evening session was to be opened with the presentation of President Willits' paper, and the rest of the session was to be devoted to the discussion of that paper, and at the close of this evening's session we recommend that the subject be laid aside to be resumed at to-morrow's session as the second topic, with an additional paper or two. The committee expects to report as the chief topic for consideration to-morrow morning, the general subject of the co-operation of the institutions represented at this convention with the Department of Agriculture, with certain resolutions and papers to be presented at that time.

The PRESIDENT *pro tempore*. The Convention will now be glad to listen to President Willits.

President Willits, of the Michigan State Agricultural College, then presented his paper, as follows:

### INDUSTRIAL EDUCATION.

There is no disguising the fact that a great change has occurred during the last fifty years in what is considered necessary for a liberal education. The claim for ages that the classics and cognate studies could alone confer real culture and the highest discipline has been contested by the sciences, and is being at the present time antagonized by an aggressiveness that has at last won for them the platform for deliberative discussion. Every college and university has yielded to the peremptory demand that the sciences shall be recognized in the college curriculum. It has become respectable to select a course that shall eliminate almost entirely those studies that three hundred years ago were considered of the highest repute, and shall include those that were then pursued only by heretics and supposed satanic philosophers.

Walter Scott's Master Erasmus Holliday has left the stage with his Latin prefixes, his village urchins, with his pedagogical cap or his soul-quickening rattan, with his horror of Doboobie, who was in his mind a poisoning quack-salver and witchmonger, who, if he was not a bounden slave to the devil, it was only because the latter disdained such an apprentice. Doboobie himself, or his successor, with his copperas and hellebore and vitriol and aqua fortis bubbling in a witch's cauldron, is no longer a vassal of hell, and has come out of his cave with his retorts and crucibles and braying mortars into the light of day, and we have built for him magnificent "elaboratories" in which he can cook his "hell-broth" to his heart's content. He has become quite a respectable person, and we dub him professor of chemistry and of pharmacy, and he has the assurance to claim equal rank at least with the doctor of musty Latin or the Greek particle, and the world is according it to him. How long this will last, or where it will end, we do not know. Whether we will or not, we must recognize the fact, and in time find the philosophy in it, as there must be a philosophy in it if it be permanent.

### NO NEED OF ANCIENT HISTORY.

But we need not go back three hundred years to find this marvelous change. Within thirty years, on this continent at least, we have witnessed a revolution in educational processes and purposes. In 1852 Dr. Henry Philip Tappan, one of the grandest men who ever stood at the head of a university, was appointed chancellor of the University of Michigan. He had been educated according to the old school, but had left Union College with some of the personality of old Dr. Nott, had spent some years in Germany, and had there caught the spirit of the new life that German science had brought to light, and he came to our infant university, which he thought the fittest field to work out the new problem. Thirty-two years ago he stood at the desk in the old capitol of the State of Michigan and expounded the new doctrine to the legislators there assembled, that in the great university science should have an equal chance and equal honor with the classics. He placed in the course of that university the degree of bachelor of science, which should be preceded by the same number of years of study and should be given from the same platform with the degree of bachelor of arts. This was the first time it had been done on the western continent, and in my class, that of 1855, were the first graduates in that course. Two worthy gentlemen stood by my side on that sultry day in June and took their "B. S." diplomas while with only equal honor we, the remainder, took our "A. B." from the hands of Dr, Tappan. He intended it as an equal honor; they claimed it as an equal honor. I fear we did not concede the equal honor. In fact, as I recollect the sentiments of our class, we felt that it was not in the power of the legislature, the regents, nor of Dr. Tappen, with all the witchery of his presence, to make a "scientific" the equal of a "classic."

The next class had none; the next, that of 1857, had 6 bachelors of science; that of 1858 had 19, and so on with varying fortunes, now more and now less, but in the main constantly increasing in numbers and character to the present time. The calendar of the University of Michigan for 1883-'84 shows that of 423 students seeking a degree in the department of literature, science, and arts, 109 are seeking that of bachelor of science, 83 bachelor of philosophy, 61 bachelor of literature, and 170 bachelor of arts. Besides these there are in the department of pharmacy 77.

I have cited the University of Michigan, because, though young in years and founded on the old system, it was one of the first to feel the new impulse; but the same rule applies in almost as marked a degree to the older colleges and universities. I have not spoken of those institutions whose prime purpose is the promotion of scientific education to the exclusion of classical studies, nor of those institutions which we more especially represent to-day, and of which I shall have something to say before I close, forty-nine in number, colleges or departments of agriculture and mechanic arts, endowed by the national land grant of 1862, with over 5,000 students devoted almost exclusively to scientific study. They are a growing power in the land that cannot be scoffed down, and if properly and philosophically managed, will add to the respect they are commanding in the minds of all impartial observers.

### WHAT THE RECORD INDICATES.

This is the record, and what does it indicate? Thirty years, it is true, is too short a time to settle the question of the absolute equality of the courses, and to test the effects of the mental discipline of the one as compared with that of the other, which was in full operation nearly 1,200 years ago, when the monk Adam Bede taught his 600 students on the banks of the Yarrow. It will take time to demonstrate what it will do in making great men. In the coming time when we shall have another age like that of Pericles or Augustus or Elizabeth, who is he, or of what line of study shall he be evolved, who shall make his times famous to all the following centuries? We may have our opinion, but no one can know. This at least is certain, that so far, in this last thirty years, the bachelors of science have in proportion to their numbers held their own well with the bachelors of art, and whether in the line of teachers or writers, legislators or men of business, they have had such measure of success as shall justify others in following their footsteps. They not only claim they are as good as bachelors of art, but they have the assurance to claim the right to be called bachelors of art. They want the name. The rose by another name smells as sweet, but there is poetry and romance in the name. There is dignity and ancestral blood in the degree, and the degree they must have, and the world of letters protesting they will "ne'er consent," is on the verge of consenting.

### A PREMIUM ON PRACTICAL SCIENCE.

So the sciences are with us, and to all appearances, to stay. But that is not all. One step leads to another. The sciences deal with the *non ego*, more directly with that great world outside of the personality of the individual, first with the facts and then the laws of the material universe, and thus they garner a harvest of comfort and material wealth that is so obvious, and so charming, and so delightful to the senses, that in this practical age we acknowledge their utility. Therefore the practical man and the so-called practical sciences command a premium. Practical men are paid the highest wages. The theoretical man who develops the principles of a science is not to be ignored, but it is the man who can apply the principles evolved by the man of theory that commands the situation. This, therefore, is the age of applied science. Applied to commerce, manufacturing, and all the varied industries of modern life. The world's progress is measured by the bounds of its applied sciences, and its prosperity by the amplitude of the practical arts. For this reason we have the demand that our system of education shall include both theory and its applications, and that the state shall furnish both.

### THE STATE AND HIGHER EDUCATION.

Let us look at this phase of the subject a little while and see what it means. For ages it was conceded that the state should foster higher education, long before it was conceded it should provide the lower. Great universities and libraries and art galleries are hoary with age, while the common school is yet young. The former were the creatures of the state, the latter until recently the child of the church, the individual, or the family. The state has now taken the latter also. Great sums were donated in founding the former; still greater are now devoted to the latter. Almost contemporaneously with this change has come the incorporation of schools of science, distinct from or in connection with the great universities. More money, therefore, has been spent by the state in the last one hundred years in the development of science than in the culture of literature, law, and theology, the prime objects of all education for so many centuries. Voyages of discovery, geographical, zoological, botanical and astronomical; the earth, the sea, and the heavens have been ranged to satisfy this craving for scientific investigation, not merely to establish a theory or formulate a principle, but to enlarge the area of commerce, to facilitate new industries. The state has had in view practical results, how the better to provide its own wants and compete with other states in the sharp rivalry for existence. In former times conflicting nations were blotted out as Rome blotted out Carthage. Individual life was the cheapest commodity. Now national life is protected by the principal of "balance of power," or the comity of international law, and individual life is bounteously cared for, paupers, idiots, and Indians not taxed included. We are antagonizing Malthus when he said human life increases in geometrical, while provisions increase only in arithmetical ratio.

### WHAT IS DEPLORED.

We deplore war, pestilence, small families, celibacy, and hanging for murder. The motto of the state is save life, not destroy it. Our increase from decade to decade is the boast of our statesmen, and the great question of modern politics is how the coming millions can best be made self-supporting, how they shall find food, raiment, and shelter; how we shall increase provisions in like ratio with human life.

This leads naturally and logically to schools of applied science. In the past we had schools of theology, philosophy, and law; later, schools of medicine, and still later schools of agriculture, engineering, pharmacy, and more recently schools for technology, all fostered by the state or endowed by private munificence. The last, that of technology, is at the present time the most aggressive, and its field and purpose, at the same time, most undefined. The same may be said of the schools of agriculture, aside from the aggressiveness. The exact status of these schools of applied science has not yet been fixed in our educational system. It will be understood that they are not strictly professional schools, to which the student comes fully equipped, or supposed to be, with a full general education, and in a reasonable maturity of physical and intellectual power; but have as a distinctive feature a moiety of their general education which the student as a rule lacks, and at the age which, and even before, in some cases, is required to enter college in the older institutions. The object, as stated in the grant is, an education, not excluding a general education, shall have special reference to agriculture and the mechanic arts.

It is plain that the intent of the promoters of this class of instruction is to give a professional tone to the education to embrace in course of instruction both elements, the general and professional, to be carried along together, and not the latter following the former, and in separate institutions. The criticism is that this plan will not be a success; that philosophically it is not well founded; that the way to make a good farmer or mechanic is in the first place give him a good education, and then put him into a professional school or on a farm or in a shop to apply his knowledge.

Now, without any doubt, if we cannot give both, it will be better to give the general, and let the practical come by the student's own experience and observation; give him the power to discriminate, and discrimination will come. There seems to be force in the position that an instruction purely practical and based entirely on the applied sciences has not been productive of the best results. On this point M. Monjean, director of the Chaptal Municipal School, Paris, claims practical experience has given decisive evidence. He says: "Some merchants of Cologne and Magdeburg, having selected from the practical schools and the gymnasia a certain number of young men of equal intelligence and capabilities, placed them at the same kind of work. For a short time, the pupils who had been brought up at the former schools maintained a certain degree of superiority; but when they had been submitted to a longer period of probation, it was found that they were beaten by the pupils of the gymnasia, who, having received a more general and intelligent education, were better adapted for all pursuits to which they might be called."

It is too soon to pass upon the subject *ex cathedra;* time only can demonstrate the truth or falsity of the position that the objects sought by the industrial education promoted by colleges for agriculture and the mechanic arts, to wit, well-equipped farmers and artisans, will be best secured by the mixed systems covered by their endowment. We have seen that the advocates of the old system, which we denominate the "classical," were as sharp in their criticisms of the new departure which we call the "scientific," but that results as to discipline and practical energy have not been adverse to the scientific up to the present time, whatever the ultimate judgment may be. So we may in like manner demand final judgment on the still newer departure of the schools of applied sciences. This much is clear, the promoters of these schools were wise in providing for substantial general education, and have not sought an education purely practical and based entirely upon applied sciences.

There is a still later departure as exemplified in some of the schools of technology, and made a distinctive basis of education by its most earnest advocates. We have well-defined views what a school of law, medicine, engineering, or pharmacy shall be. Its object is to teach the special underlying principles of law, medicine, &c., with just enough applied science to demonstrate the principle, leaving the practical skill to come from the practice outside of the school. The lawyer's first case is at the expense of his client, the doctor's at the risk of his patient. The object of the school of law or medicine is to reduce this expense, this risk, to a minimum, by giving the student a knowlege of the principles of his profession, so that his skill shall take the right direction. That is all the public has assumed to do in any of the professional schools heretofore established.

But this school of technology claims something more, or rather the advocates for technology in the public schools are claiming for it something beyond the scope of all other schools, to wit, the education or development of skill. I can understand and indorse a school of technology that shall make an intelligent mechanic, intelligent in all the principles of mechanics, in the law of motion, of sound, of light, the kinds and strength of material, of friction, inertia, of electricity, steam, chemistry, with just enough of the manual training to demonstrate the principles. Such a mechanic with this knowledge can step into a shop and in a short time distance the man who has no schooling in these principles; he can sooner acquire the skill in his profession, and it will be of more service in that his intelligence goes with it hand in hand.

### THAT SKILL COMES FROM THE SHOP.

The state may give him the principle, but the skill must come mainly from the shop. The state cannot assume to teach all the practical arts any more than it is its province to manage all the farms, or operate all the railroads, or run all the machine shops. It can give general or special instruction in the principles upon which the arts are founded, so that personal aptitude and private enterprise shall have a wider scope and be of a more general benefit, and there in my judgment it should stop.

The direction the present schools in technology have taken is largely the outgrowth of the condition of affairs in the industrial world. It is almost wholly in the line of the mechanic arts. Mechanical science has now reached such a stage of development that the mere workman—that is, the man who devotes his whole time and energies to the manual labor of his employment—will rarely have a comprehensive knowledge of the industry he seeks to promote. Then, again, the division of labor is so great that a majority of the laborers know only one thing, or perform only one operation in the many that go to make up the product, and know nothing of the general principles. The laborer becomes a machine if confined to the machine, and while the industry gains in the one direction by the skill of the human machine, it loses in the other the intelligent inventive genius of the man of observation, thought, and experience. Further, the day of the old-fashioned apprenticeship is ended, or practically so, when the young man from fourteen to twenty-one was bound to serve, and the master to teach all the principles and the arts of the industry, so that with an experience of seven or more years, and the general knowledge picked up here and there, he became a mechanic well versed in all the principles and details of his profession.

### A DEMAND FOR THE SCHOOL.

The result is, that there is a demand for a school where these principles may be taught, and through which the brightest intellects may be brought into sympathy with the mechanical arts. Experience has demonstrated the wisdom of complying with this demand. The march of improvement in the industries is almost measured by the intelligent application of science promoted by institutions directly or indirectly devoted to their interests. I say directly or indirectly, for all sciences illustrate each other and are cognate in some of their points, so that there is hardly a science which does not in some degree promote an art the outgrowth of a kindred science.

The importance of these schools has been so clearly set forth in the recent report of the royal (English) commissioners on technical instruction that I cannot refrain from referring to it. It will be remembered that at the close of the Napoleonic wars all the industries of continental Europe were prostrate, while those of England were in the most prosperous condition. England was not only mistress of the seas, but of the world's industries. "Before factories founded on the inventions of Watt, of Arkwright, and Crompton had time to take root abroad, and while England's commerce and manufacturers increased from year to year, the great wars of the early part of this century absorbed the energies and dissipated the capital of continental Europe.

"For many years after the peace England retained almost exclusive possession of improved machinery. It was made a penal offense to enlist English artisans for employment abroad, and for years the export of machinery abroad was prohibited. Thus when less than half a century ago continental countries began to construct railways and erect modern mills and mechanical workshops they found themselves face to face with a full grown industrial organization in England which was almost a sealed book to those who could not obtain access to her factories."

These were the facts half a century ago. But the whole phase of affairs has been changed. Continental Europe is now a sharp competitor of England in nearly all industries, and in many in advance. What has brought this change about, and why, relatively, has England fallen behind, and continental Europe forged ahead? This was one of the problems submitted to the royal commission, and the following in part is the answer:

### TECHNICAL SCHOOLS ABROAD.

"To meet this state of things abroad foreign countries established technical schools like the Ecole Centrale of Paris and the polytechnic schools of Germany and Switzerland, and sent engineers and men of science to England to prepare themselves for becoming teachers of technology in those schools. Technical high schools now exist in nearly every continental state, and are the recognized channels for the instruction of those who are intended to become the technical directors of industrial establishments. Many of the technical chemists have, however, been and are being trained in the German universities. Your commissioners believe the success which has attended the foundation of extensive manufacturing establishments, engineering shops, and other works on the Continent, could not have been achieved in the face of many retarding influences, had it not been for the system of high technical instruction in these schools, for the facilities for carrying on original scientific investigation, and for the general appreciation of the value of that instruction and of original research which is felt in those countries.

"With the exception of the Ecole Centrale of Paris, all these schools have been created and are maintained at the expense of the several states. The buildings are palatial, the laboratories and museums are costly and expensive. Your commissioners cannot repeat too often that they have been impressed with the general intelligence and technical knowledge of the masters and managers of industrial establishments on the Continent. They have found that these persons as a rule possess a sound knowledge of the science upon which their industry depends. They are familiar with every new scientific discovery of importance, and appreciate its applicability to their special industry. They adopt not only the inventions and improvements made in their own country, but also of the world at large, thanks to their knowledge of foreign languages and the conditions of manufactures prevalent elsewhere."

### A STRONG ARGUMENT.

This report, coming as it does from such a source, would seem conclusive of the subject of which it treats, and their final opinion is of great weight. They say that no argument is needed at the present day to prove "that in order that England shall maintain the high position which she has attained in the industrial arts, it is incumbent upon her to take care her managers, her foremen and her workmen, should, in the degrees compatible with their circumstances, combine theoretical instruction with their acknowledged practical skill."

What is the lesson for us? The United States is to compete, to some extent is competing, with the full grown industrial organizations of England and continental Europe. Our industries are an important factor in our body-politic; not the controlling one, but a tremendously powerful one, and our future is to be largely shaped by our ability to manufacture as well and as cheaply as any one else. To do this we must put intelligence into our shops and theoretical instruction into our schools. We must occupy this ground ourselves, with our own brains and muscle. Two-thirds of our foremen and master mechanics are foreigners, educated in the technical schools of Europe, or instructed by an apprenticeship, which is not germane to our institutions. An apprenticeship is considered by our young men but a remove from serfdom, and the only chance we have for success is to import our skilled mechanics or educate them here.

Hence there is a place, and a large and well-defined one, for schools of technology. It is in the line of the report referred to. Institutions where may be taught the sciences upon which our industries depend. The technical schools covered by these reports were for theoretical instruction with only application of the sciences sufficient to demonstrate the principle. The commission recommend no others. They say in effect that the attempt to do more has not been successful. The impression is most decided that the effort to teach technology to children in the public schools will not be promotive of the highest success, and not commensurate with the vast expense it would entail upon the public school system.

### THE PROPOSITION SUSTAINED.

All these circumstances sustain the proposition that there is neither profit nor success in the attempt to incorporate technical instruction of the practical kind in the lower schools, even in populous Europe. The conclusions I have arrived at on this subject are:

1. That it is desirable and the time is opportune to establish and foster in the United States schools of technology for instruction in industrial arts.
2. That neither here nor abroad is it practicable to make skilled artisans in the public schools; that the practical skill must be sought for in the shop.
3. That in a country like ours, where four-fifths of the population are in constant use of tools from early chilhood up, it is labor lost, and money wasted, and time squandered to impose shop work as part of the regular duties of the public school.
4. That as our cities increase in size there is a class of children who can, perhaps, be reached in no other or better way than through the shop.
5. That shop work, with few exceptions, will be fascinating only so long as it is play: that it will lose its charm when it becomes a duty.
6. That a Jack-at-all-trades is generally good at none.

The danger is that in this era of applied science, we go beyond what is practicable. The subject of education has its radical reformers, as well as politics and religion. In some things right and some wrong, it is for us who wish to know what is truth to exercise discrimination. The advocates of industrial education are likely to mistake, in the language of another, "a child's wild enthusiasm over a new occupation for a newly-discovered aptitude in human nature. The well-known law of school life will find no exception in this case, and that is that children can be excited to a prodigious pitch of intensity in behalf of a novelty in the school room, whereas the same exercise becomes only an additional daily grind when taken by a new set of students as a part of the regular course of study." It may do as an occasional exercise, and then its success will depend so much upon the fertility of the teacher, his own personality and systematic enthusiasm, that it would be unsafe and unprofitable to make it a feature for all schools, with teachers of all grades and qualities.

There remains for us in as brief a time as possible to apply the foregoing suggestions, so far as they are applicable to our schools for agriculture. They are properly classed among the industrial schools. There is a radical difference between agriculture and the mechanic arts, which deserves to be noted. We find a much larger element of uncertainty in the one than in the other. A skilled artisan can select his material and apply his principle and construct a machine that shall be practically complete, perfect, and in accord with his plans and expectations. But no farmer can with certainty predict the outcome of his labors. What with the weather, untimely frost, difference in soils, blight, and mildew, uncertain germination, injurious insects, birds, and animals, coming unheralded and in unexpected character and numbers, noxious diseases to crop and beast, and the vicissitudes of seed-time and harvest, there would seem to be too much uncertainty in agriculture to call it a science, and too many elements of doubt to be solved anywhere by any one, much less in a school room by theorists. For this reason the agricultural college ought not justly to be held to as strict an accountability for certainty in scientific results as institutions more distinctively scientific. You can make an absolutely correct mathematician, a reasonably pure linguist, a fair logician, and a watchmaker who can construct a time-piece that will not vary thirty seconds in as many days; but no agricultural college can turn out a farmer that can raise exactly 31 bushels and 27 pounds of wheat per acre, year after year, on the same field, in the same year on two fields of similar character. Agriculture is in a sense too broad to be a science, or rather is the co-ordinate contribution of so many sciences that the field is too broad for any one man. Nature and Providence have much to do with its processes, and we can only assist the one and submit to the other; we can control neither.

This being so, the natural inquiry is, why then have the agricultural college or the experimental station? The answer is obvious. A special and thorough knowledge of the laws of nature as allied to agriculture will reduce the reducible uncertainties to a minimum and raise the production to a maximum. The college traverses all these points and brings to bear all cognate sciences. There are causes for poor crops that can be prevented, and there are processes to be discovered and taught that can promote productions, whether it be in a hill of white beans or in the fattening of a steer. The range of practical knowledge is so great that it is unwise to leave its acquirement to the uncertain chances of the chance farmer with chance information. The industry is so great that it is entitled to bring to its aid all that science can bestow, experiment can demonstrate, and observation can classify. The farmer should be the first to reap the benefit of any new development of science, instead of being, as now, the last; he is entitled to have at hand the means to apply for himself and test and experiment; and these means are furnished by the agricultural college and experimental stations. There has been too little intellect and too much luck in his processes, too little live investigation and too much following in the rut made by others. He has neglected phosphates for his worn-out soil, especially that best of all phosphates, mind phosphate. Aristotle said that the best manure was the farmer's foot; so we may justly say the best fertilizer is the mind of the farmer. The enhanced power to produce comes from an intellect that commands the elements and harnesses the laws of nature. The power to produce is in the earth, and the power to increase that production is in man. The Rhode Island Greening has been made such by the skill, culture, and intellect of man. In all the range of natural resources man has improved upon crude nature and made it bloom and become fruitful where before there were sterility and imperfection. This increase and fructification should be credited to mind, and whether it be applied to the soil or to the mine, on the farm or in the shop, is the element of human creation that can be traced through all the varied forms of industry as the woof of gold in the web of nature. So these great industries have taken the crude materials from the mine and the forrest, the sea and the land, and injected into them a wealth of intellect and skill, and have increased their value to so wonderful a degree that they almost challenge the Divine Providence that furnished the material at first hand. These great results are a something as worthy of being measured and weighed and analyzed and separated from the original stock as are the elements of the stock itself. They are crystallized mind, the product of the ages, as positive and real as crystals of anthracite which the ages of geological change have injected into the seams of earth's structure.

Let us weigh some of them a moment. According to the census of 1880, the total value of the produce of the farms of the United States for the year 1879 was $2,213,402,564; the total value of the manufactured products was $5,369,579,191. The raw material of these manufactured products was $3,390,823,549, which, deducted from the total value, leaves $1,992,656,642. This large sum is the increase added to the raw material by the skill, intelligence, and capital of the manufacturers, and is only $220,000,000 less than the total produce of the farms of the country, and is a production as much as a bag of wheat or a four-year-old colt, and is the creation of man, while the farm produce is in part the production of nature and not of man, so that it is clear that those employed in agriculture actually produce less value, though they number 7,500,000 of people, than those employed in manufactures, who number only 2,750,000. What is the cause of this great disparity? It cannot be muscle, and must be well-applied intelligence: it can be nothing else. It is not capital, because the capital engaged in manufactures is less than $3,000,000,000, while that in agriculture is over $10,000,000,000; but the intelligence applied to farming leaves 46 per cent. of its capital unproductive in the unimproved part of their farms, while every dollar of industrial capital in the manufactures is utilized, down to the very horns and hoofs of the steer.

By some means this disparity must be changed. The intelligent farmers of the country begin to realize that special attention must be given to the subject. The farmer, in the first place, has no part in fixing the valuation of his products; others make the price of what he sells and exacts the price of what he buys; he has speculators at both ends. In the second place, as before said, his profession is the last to feel the impulse of any new discovery. He has the right to insist that he shall have scientific men devoted to his special interests, if they be chemists, or botanists, entomologists, or what not, who shall investigate by original experiments, as well as at once utilize any fact or principle, machine or process, for his benefit. He cannot do it himself, at least in the present stage of agricultural intelligence, and he has not the means successfully to do so if he had the intelligence. The poet says:

> "All knowledge is not nourishment. The mind
> May pine upon its food. In reckless thirst
> The scholar sometimes kneels beside the stream
> Polluted by the lepers of the mind."

So the farmer has asked for these colleges and these experimental stations, and he asks that his sons and daughters shall be in line with this investigation, shall keep it company, so that the knowledge thus obtained shall nourish: so that they shall place upon it the seal of their own interpretation; shall stand at the fountain head and see that the stream shall be free from pollution. The Government has nobly responded to the demand.

## IN CONCLUSION.

But a few words more on the general subject and I am done. Applied science is not science itself. Let us not forget that. Among the thousand new and beautiful and valuable things this practical age is producing let us remember that back of all was the quiet student, the diligent collator of facts, who has made all these things possible. He has been so quiet about it that we may not recognize our obligation to him. He is the greater in that his was the germ that gave vitality to all this growth. Let us, therefore, not neglect original work, research, investigation. It is in science that we have room for the fullest scope of the greatest minds.

Why is it that we have no master-pieces in this day? Why do we turn with such reverence to the literature and art of the past? If this age knows immeasurably so much more than former ones why is it not sufficient unto itself? Why is it that so much of the "new is not good and so much of the good is not new"?

A recent writer has said with reference to art, "The great artist is the rich, ripe fruit of a whole people's art life; is the high-crested wave that rises out of a whole sea of similar tendencies and endowments." Where is the crested wave on our sea? There is activity enough. In educational matters there is money spent beyond precedent, and appliances and labor-saving machinery and easy books by the cord, and diplomas in the open market, and a world full of literature, art, and science; but in all this sea there is no crested wave!

We ought, perhaps, to except science. In that there is added power, advance in absolute knowledge. All along the line there are discoveries of something new. But they are discoveries in the outer world, the finding out nature and nature's powers and laws.

Columbus discovered a new world, he did not create it; it lay in beauty under the smiling sun and beneath the shining stars ages before he started his prow for the Indies. He was not seeking a new world; he desired a straighter course for the old, and he stumbled upon this, which God and nature had placed in his pathway. You say this was an accident; I answer yes and no. Yes, because he was not looking for it as the astronomer looks for the planet he knows must exist, because he has first found it in his study. I say no; it was not an accident, because he was not accidently on the high seas that misty morning when "Land Ho!" was hailed from the masthead. For days and days there had been drift and sea-weed and land-birds that could come only from the continent just beyond the horizon. Columbus saw beyond the horizon, he had seen beyond it before he left the shores of Spain. That was no accident. The years of study had placed him in line of the now fact, just beyond the horizon. And after all, shall we say that this has not been true every step in human progress?

We say men have discovered something new either in law, human and divine, in logic, or in fact. What does it mean? Only that they saw beyond the horizon; there all the time lay the truth, the land, the continent. Euclid cried, "Eureka! Eureka!" as he went in bounding joy from the sandy beach upon whose tablet he had demonstrated the problem he had for years sought to solve. But the law he demonstrated was as old as the fiat of the Almighty. He had only found it; he had placed himself on the high seas as Columbus had. Phidias saw beyond the horizon, so did Aristotle and Socrates and Bacon and Newton and Shakespeare and Moses and Peter and Paul. Christ himself brought life and immortality to light, but they existed before he lifted them above the horizon. Revelation is not creation. The truth, the law, and the fact are eternal. Men discover them, men reveal them. God occasionally shows beyond the watery waste the outlines of the unknown, but beneath are the everlasting hills, unknown, but not unknowable; but from Eden's morn to this day of grace no man has found anything, or revealed anything, except when on the high seas seeking it, except when in line with God's thought.

So I am not discouraged over the present tendency toward materialism over this voracious appetite for facts. We are after truths just beyond the horizon; they are a part of the great universe, and will in due season adjust themselves in harmony with divine law. They are but waves seemingly resisting the tide, but all the time carried by its mighty swell. All this vital energy will in the end work out wholesome results. But do not let us waste our energies by violating the wholesome law of mind, or sacrifice our children beneath the wheels of Juggernaut. There may be a better way for them and for us. Let us put ourselves in line with the best, for if we go on cramming and hurrying and constructing royal highways to learning, the first we know we will come to a stop against something hard not of our own choosing. Nations do so frequently. This one struck something hard in 1861, and when we found ourselves unexpectedly face to face with it we wrestled with it and mastered it, and came out the better for it, not the better because we had been in the wrong way, but because we had the courage and will and power to blast a road through the rocks. So it will be with tendencies. This tendency toward material facts, ignoring too frequently the good, the true, and the beautiful, will go along swimmingly till one of these days it will strike something that will stop it and dam it up, and then there will be a sea, and high over the billows will be a crested wave around whose summit will bathe the sunlight.

Mr. ATHERTON. I do not wish to open the discussion on this paper to-night, a paper to which I have listened with very great interest. It is so full of thought and suggestion that it seems to me it is one upon which we ought to have a very full and free discussion—a discussion which I question whether or not should be proceeded with to-night. It occurs to me that perhaps we should postpone the discussion until we have a fuller attendance to-morrow morning, and I simply rise to throw out this suggestion. I presume very many of the delegates will have suggestions to offer upon some special application of the line of thought which has been given us, and I should be extremely sorry if so vital a question as this presents should be inadequately treated for want of time and want of attendance. I am very much inclined to favor an adjournment or a postponement, and therefore, unless some one is prepared to speak and open the debate, I will suggest some one to open the debate to-morrow, when we shall resume the subject. That will bring it fully before the convention for discussion. I merely throw out this suggestion.

Mr. GLENN. It occurs to me that as the evening is not over yet we might be able to throw out some suggestions, and then enter into the fuller debate to-morrow. It is a very important question, and no doubt one which is entirely within our domain. It is a question which I attempted to discuss before the teachers of the country three years ago at Saratoga, and I felt then that it was a very important one, and I am glad that it has been broached here. The question is, whether we shall engage in practical education and seek to teach skill in the schools at the expense of training. I have come here as a learner, and do not come with the expectation or intention of attempting to teach. I wish to learn something, and this question, sir, is a vital one to us and to our children. It is one which I approach with great trepidation. I confess to some fear in laying aside the old plans which have done so well in times past. While I know that it is impossible for us to study everything—everything of a scientific nature alone—yet at the same time I am afraid to leave off all study of the languages. I am afraid to discard them from our schools and to depend entirely on science for mental training. If we must do both at school, we should make men first, and we can make mechanics afterwards. You may take a boy and train him from the time that he is a child to strike with a hammer, and when he has grown he can strike with the precision and with something of the force of machinery, but in making that machine you have destroyed the man. That is the trouble, and I cannot say that I am prepared to enter upon any course which tends in that direction. At the same time I see that it is important that we should introduce more practical knowledge, more training and skill for industrial pursuits into the schools, than we have had in the past. I am willing to offer a motion, if the gentleman will not, that we postpone this discussion until to-morrow, when there will be a larger number here to engage in it.

Mr. KNAPP. There are several considerations, Mr. President. To-morrow will be a very busy day. One of the many things for which we have assembled has scarcely been touched upon as yet; that is, how can we practically co-operate with the Department of Agriculture in carrying on this experimental work. [Applause.] Now it seems to me to launch out into a general discussion, however profitable it may be to us and however important and interesting it may prove, would be unwise until we settle the many questions for which we came. I hope therefore that question will be settled to-morrow morning, and some plan will be devised by which co-operation can be commenced immediately. For one I have not been in favor of waiting until further legislation can be secured, for I am in favor of proceeding with the appliances and the means we have at our hands to do the best work we can under the circumstances. Now I hope that will be the judgment. Then we have to see His Excellency President Cleveland; that is another very important matter that will come to-morrow. I fear that when these matters are disposed of we shall not have a great deal of time to discuss these general questions, however desirable it may be. I would prefer for one to linger here a half or three-quarters of an hour to discuss it—not to finish it; for we might discuss forever, yet the problem would only thicken around us. Therefore let us reverently broach it and discuss it for a while and drop it to ponder more.

Mr. ATHERTON. I very cordially agree with all that President Knapp has said with regard to the importance of certain phases of our work to-morrow. The committee have proposed that the subject to which you refer shall be taken up the first thing in the morning, and that must necessarily come first. How long it will take to dispose of the question no one can say. It is possible that we may finish it in an hour. I do not regard that question, however, as the only one which we are to discuss. From the suggestions thrown out in the circular addressed to us by the Commissioner of Agriculture, and from the results that have grown out of our own practical experience and reflections and observations, this question has forced itself upon us in our own schools: How shall we make the institutions of which we are the representatives do their work in a manner which shall be acceptable to the people who sustain them? If we cannot learn something from the experience which we have had, and from the suggestion of sister institutions in that direction, then, however effective a plan we may adopt for co operation with the Department of Agriculture in the line of experimental and cooperative work, we shall fail, and this convention will have failed in one of its important purposes. First, we came here to see what each other are doing, and how we can learn from one another to do better; and secondly, as a natural result of that, how we can co-ordinate our work, not only with the institutions but with the Department of Agriculture, and not at all with a view to subordinate all others to the one question which President Knapp suggests. It is a question which in my judgment is quite as vital, and one which needs to be thoroughly discussed. If those present prefer to go on, of course I have no objection; but it is a question which will interest a great many more than are present to-night, and I fear that if we go on we shall have it all to repeat to-morrow.

Mr. CHAMBERLIN. I have listened to the address with great pleasure. It is a very valuable address, and the thoughts have been well laid before us. I fear that to-morrow will be so crowded with business that we could not give the subject that discussion that we can to-night, unless we have the paper reread. For this I fear there might not be time, and in that case I prefer to have the matter discussed to-night as far as possible. It would be a pity to leave to-night without having the subject discussed, to some extent at least. I would be pleased to take part in the discussion if it goes on.

Mr. WILLITS. I have simply a word to say. My first purpose is always to lay down the general principles and the general plan, satisfy myself in reference to what you might call the logical philosophical principles, and then I can look at the details. I have not come to the details yet. I have given in that paper the thoughts that have come to me as I have advanced in the discussion of the subject. I want to hear from the gentlemen who have been in the work for years, as I have not, that I may have the benefit of their knowledge and experience in my future work. I would like to have the subject discussed. I do not care anything about that particular paper. I would like to know how to teach our boys best, and I would like to have you devise, if you can, any system of instruction that will lead the boys, that shall draw the boys, to the institution. It is now a conceded fact, Mr. President, that the average boy goes to the old-fashioned college rather than to the agricultural college. Why? Is there any way out of it? Is there any way that we can make them so full of ambition, so full of interest that we can bring the boys in floods to our doors? If not, if there is a difficulty in the way, let us know it; let us discuss it, and if there is any way let us know how we can make our colleges popular.

Mr. GLENN. Let me say one word. I do not wish to make myself troublesome, but it does seem to me a good many important questions demand prompt attention. It has been discussed a great deal in this country whether boys ought to be forced on the farm, whether we ought to require and make them go to the work-shops, or whether we ought to hire them. Then, again, there are those who insist that we should exclude foreign languages from agricultural colleges and devote our time and money to teaching agriculture and mechanics.

I have been teaching all my life, and I watch very closely where and by what means the highest developments come, and for one I am afraid to lead out blindly in any direction, and I am like the professor over there (Mr. Willits), I have not worked it out to my satisfaction. It is one of the most important and intricate questions which we can discuss. I came here for one to hear some discussion on that very question—whether we must require the boys to do work. Now I hear another gentleman say he is working at it, and I am glad to know it The people are demanding a change toward practical education, and if we should say turn out your languages to-morrow very many would indorse it. We have a fearful power in our hands here, sir; let us use it wisely, and step carefully, and not rush in where "angels fear to tread."

Mr. SANBORN. Mr. President, the question before the convention is on adjournment. I hope the motion will be put without further debate, because the motion is not debatable. I even should hope that this convention, which met here about an hour ago, would proceed to do the work before it. We have an hour here, and if we limit the time of speeches to ten minutes we can do a good deal of work. Let the motion be taken now.

The motion was lost.

Mr. TAYLOR. The subject of practical industrial education is one to which I have given some attention, like my friend on the right (Mr. Glenn), and I think it one of the most important subjects which can be considered in connection with your agricultural colleges. The question—probably the most important part of the question—is how shall they begin. Shall they begin on the dead languages, or on the living languages, apart from the English language, or shall they be general in their education, not excepting a general knowledge even with the languages, such as giving a good idea at least of the roots of dead languages, which is of great service in the study of the sciences generally.

There are other points which have to be considered, that is the branches of chemistry—the branches of the general physical science, such as chemical microscopy, entomology, &c. In order to begin with the young minds you have to get them interested, for it is sometimes difficult for the young mind to comprehend wherein is the value of the study of the problems of Euclid. I, in my young days, gave some study to that, and the moment that I found that I was able to understand thoroughly a theorem why I felt as much rejoiced as if I had received a large sum of money. I have seen young men dance with joy when they were able to go through one of Euclid's problems.

It is not, in my opinion, well to undertake to force children to learn a branch of trade they do not like. This forcing a child to go into something he does not understand, and to engage in this and that sort of business; they are not going to be as well respected as perhaps their neighbors who are not doing this. The great point is to make it appear to children that there is something exceedingly interesting in it, and when they get this interest they will study it for the interest's sake, and the money will come afterward. Real hard work is to be done, and will be done, when they grow up, and when you have shown them in early education the beauties of science. Sometimes some of the greatest and most wholesome enjoyments arise in certain individuals simply because they get a very slight insight into chemistry or into some other kindred science; they were delighted when they found they could comprehend a little of it, enjoyed, perhaps, the change of one color into another. They might not understand that these facts which they were gathering, bit by bit, were afterward to form the chief enjoyments of their lives. They would get into their minds a large view of the physical world without knowing what it was to be applied to hereafter. I will give you an illustration.

[Mr. Taylor related at length certain interesting experiments of his in connection with acids and alkalies upon fibers; also with raw potatoes.]

Mr. CURTIS, of New York. Mr. Chairman, the question is, how shall the industrial universities and agricultural colleges make themselves more useful, and how shall they confine their instruction so as to be more attractive to the youth of the country. Now, sir, I think it is a mistake to create the impression among the farmers' sons that when they go to school they go there to work. I think that is one of the greatest mistakes, and is one of the reasons that so small a number of them take advantage of these schools. The combination of labor with instruction is very unpopular with the farmers' sons. Of course, an amount of labor, to the extent of demonstration, would not only be practicable, but would be judicious, and, in my judgment, labor in connection with the industrial schools should be to no greater extent than that of simple demonstration, and that should come in, not with the idea of labor, but simply to make demonstrable the principles of science which may be taught in those schools.

Now, I clearly agree with the gentleman who read the valuable paper this evening, that these schools should be made more scientific. The great want of farmers is a better knowledge of science, or, in other words, a better knowledge of the principles of agriculture. There is not a farmer in the country who does not realize more or less this deficiency in himself, and there is not a farmer who, if he felt and knew that he could give his son an opportunity to get a better knowledge of the sciences but would appreciate the opportunity and would value it. But the coupling of the study of languages and of labor, and the great mass of instruction which is too often incorporated in these schools, is an objection, and renders the schools unpopular. There should be scientific teaching and scientific instruction, with demonstration, but beyond that I think it is unwise to extend the instruction, so far as the farmers' sons are concerned. Now, one difficulty, in my judgment, with the agricultural colleges in their efforts to popularize them, and make them more attractive to farmers' sons, is the want of harmony existing among them. One college has one system, another has another system. Now, if in this convention there could be established a community, a unitary system that should be as practical as possible, I think it would do good.

I only rose to throw out these few suggestions, and to bring the matter back to the question, make it germane to the question before the convention, that there should be more scientific teaching in agricultural colleges, and that there should be coupled with it the idea of manual labor only to the extent of demonstration, so that the scientific knowledge and the practical knowledge should go hand in hand to that extent which would make them more popular and more beneficial.

Mr. WOODHULL. I simply wish to make one remark applicable to what this gentleman has said. The combination of the practical—of labor—with the general teaching is found admirable at West Point and Annapolis, and I do not really see why the young men who go to these agricultural colleges should have any more objection to work on the farms, or work industrially, than the young men who go to West Point and Annapolis should object to work in their particular profession. The young men at West Point or Annapolis are treated as common soldiers; for the four years that they are there they are in the ranks; they do everything that soldiers do on the frontier in actual service, and in that sort of way they learn practically as well as theoretically in their profession. It seems to me that the colleges to be useful should combine theory hand in hand with practice.

Mr. CURTIS, of New York. The difficulty is simply this, at West Point and at Annapolis all are taught upon an equality——

Mr. WOODHULL (interposing). Are not all in the agricultural colleges on an equality?

Mr. CURTIS, of New York. I do not consider, sir, that the class of students in the agricultural colleges who are compelled to labor are put upon an equality with those who do not labor; it ordinarily creates a difference of circumstances, of surroundings, and to that extent it is objectionable; it can never be popularized in this country. If all the agricultural colleges require all the scholars to labor and go through with a practical demonstration of all the sciences that were taught, that would be a different question, but to confine it to those who take up agricultural science and require them to labor and neglect all others is making a distinction which in the eyes of young farmers is degrading to the young man submitting to it. The history of these colleges demonstrates it as a fact, but if you will simply confine your labor—make it more in the line of play or co-operative with the science which is taught—in the line of instruction or demonstration—it puts it in a very different shape.

What is the great want with young farmers? The great want with young farmers is a knowledge of science which they can apply to their business, and that is what the agricultural colleges should teach. Now, if we make the distinction general, if we make the distinction so broad, so plain, and so public as between agricultural colleges and the other colleges that the farmers would understand that the agricultural college was their college, and the boys would consider it to be their college, there would be no trouble about popularizing it. But that is the trouble. It is not their college—at least, they do not understand it so—and there needs to be a line of demarkation drawn between the agricultural institution and the other institutions, so that the farmers' boys may know that this is the place for them to go to be educated for their special profession, and not be obliged to work. They don't go away to school to work; they get enough of that at home. I may be wrong; I am simply a farmer. I know what my own deficiencies are in the line of demarkation; I know where my mistake was made. I spent three years studying the languages. Now I would give a great deal if I had spent those three years in studying agricultural science. It is worth no more to me than it would be to any other of the farmers in the country, and if you can get that impression among the farmers, that their boys would be better fitted to be farmers, then you will popularize these schools; but you must make no caste distinction and have no degrading surroundings. Let there be no understanding that the farmers' boys must work and have their bruised and sun-burned hands and faces, and the other boys be sporting around as gentlemen. That distinction will kill any agricultural college, I don't care how popular the professors may be, how learned and how zealous they may be; it will kill any agricultural college. But put them all on an equality, like your soldier boys, then there will be no trouble.

Mr. KNAPP. I do not want to enter into a discussion of the question, but simply to reply to the last remark of my friend, Curtis. I thought he was on the right track; but, sir, in some way he seems to be entirely "off his base," so far as I can understand it. He seems to consider that work when brought in comparison with non-work is a degradation. That is just what wants to be taken out of the boy if he is to be an agriculturist. He says it is a failure. I simply know for one that it is not a failure. Of course, it is under its crucial test almost where it is brought in comparison in the same college. I would be glad if all the young people were compelled to observe the same regulation, and if the whole school could be put into one grand current. I think that is the grand thing to do; but I found in Iowa that the agricultural students, or the students that labor, had the little finger turned toward them quietly, and they felt a little strange. Now, it seemed to me, unless that could be overcome and they be made to feel that labor was honorable and that they were proud of it, that they did not measure up to the full standard of farmers. I went to work to organize a force to make labor honorable and make the students proud of their labor, and I am happy to say that is the condition of things to-day. The non-workers, called the special agricultural students, of which we have about sixty—I mean sixty studying agriculture as a profession, the same as any student would study law, for they all receive a certain amount of agricultural training—these non-workers called the special students "Hay seeds." The boys talked to me about it, and I told them to make the name honorable, and so we immediately organized a society called the "Hay-seed" Society. We published a paper called the Hay Seed, and to-day the honorable name in our college for the best boys, for the most trained boys, is "Hay-seed" boys, and as a matter of fact, sir, all the higher offices among the boys, without exception, are taken from the "Hay-seed" class. And it was remarked that during the past term in not a single instance among those sixty boys had one of them been corrected. They are proud of being "Hay-seed" boys, and they are working that they may make work honorable. I believe with them it is possible. I do not want anybody's boy to come to our college and have it instilled into his mind that it is going to be degrading if he pulls his coat off and goes to work while he sees another boy so unfortunate that he does not have to work, but sports around idly. I want this feeling to prevail. It is the sentiment I first instilled into my own boys' minds; that is, that you are unfortunate if you do not work. We shall see in a few years what will become of you if you are lacking some of the discipline which you can get in a college—that is, persistency, a willingness to work, a willingness to take hold of anything you ought to take hold of, turn it over and ascertain what there is in it, a wish to grapple with the world, to make yourself a force among mankind, and to dare to stand up and say yes or no anywhere; in other words, to be a man. That is training. Now, what is a man of labor? That is open to discussion. It is the character of institutions of labor to which I was referring. While——

Mr. GLENN (interposing). I would like to interrupt to ask whether you require the students to work or hire, them? Whether you have a law requiring them all to work?

Mr. KNAPP. We require and hire, both. The experience of our school is that first we undertook, to express it in Western parlance, to set on a barrel of eggs and hatch them all. They made our college a sort of university, instead of taking up one single line of work and making that job a thorough one, by putting all our force into it. We spread until we got so thin on the outer edges that we attracted the attention of mankind. Now I have been a great admirer of that grand school in Mississippi. They take a single line of work. We haven't got to that, and hence only a portion of our students are required to work—the students who study special agriculture.

Mr. GLENN. In Michigan it is the same.

Mr. WILLITS. It is all work.

Mr. FAIRCHILD. In Kansas we work boys and girls, too.

Mr. KNAPP. I think there are difficulties in reference to the agricultural colleges which arise largely from our conception of their objects. The demands for general education have come in and are so peremptory and assertive that it is in proportion as we are willing to leave the whole thing to general education that these colleges were designed to prepare young men for special lines of work. It modifies our views of the whole subject. Now we say, would you compel the boys to go to the farm? No more compel them to go to the farm than we would compel students who attend the law school to practice law. That is one question. Another question is will you fit them for the farm? That is another question. Even if fitted for the farm have you made the science of agriculture so attractive, have you given to it such a degree of dignity, have you instilled into the minds of the students such a love, such an enthusiasm for agricultural pursuits that they will naturally gravitate to the farm and ren er it impossible to keep them from it; or have you gone round the corner? "Why I don't like to punch them and drive them to the farm. It is a hard job. They will get only $15 or $25 a month, whereas they might make a good lawyer and perhaps be President of the United States some day." With that kind of talk going on (and I have heard a great deal of it), you are perverting the whole spirit of the college. Without designating any one in particular, I will say that I have known of colleges where the whole conversation was in that direction. They would say, "We cannot compel these boys to go to the farm. We are powerless. In the course of fifteen years of the two hundred graduates only six boys went to the farm." Now when that tune is changed, and when agriculture is made attractive, I say the boys will naturally gravitate to the farm. I said to a young man the other day who is about to graduate, "Are you willing to accept a position on a salary of about $1,000 a year?" "No, sir," said he, "I have a position which is a better one, I think, than any I know of in the United States. My dear sir, I have gone into partnership with my father, in farming, and I am going back to the farm." I knew of the enthusiasm of that young man; I knew of his brains and his training. He has already formed his plans for his future home and his determination to make it an attractive home, to make it a cultivated home, and if that young man lives ten years I predict that he will be the center of an agricultural force; he will have agricultural lectures inaugurated in his community, and he will be the light and guide for a hundred miles around. That is the kind of young men that I want to see go out to influence a great State, and it will only take a few of them—not men who are agriculturists by accident, and will leave it whenever anything better is offered—but men who are agriculturists from principle, who believe it the grandest profession on the earth, and who can stand up with an old coat on and hold up their soiled hands and feel as proud as a king. That is the kind of agriculturists we want; that is the kind I want to see the colleges produce—but every point that we touch is so productive of thought that we are inclined to drift and talk too much about it.

More than thirteen years of my life were spent in classical creations. I studied and discussed the problems of Greece and Rome, and in its delights the sun shone upon me as it did upon Paul of old, and a message was sent that blinded my eyes. I beheld things anew, and I want your eyes annointed to-night that you may find salvation and be converted to this new English language doctrine that is to save the world—the university world at least. [Great laughter and applause.] While it is a grand thing to know, yet we must admit the grandeur of the English language also. It is one of the most practicable that man has ever known; and a man is on an island unless he has that language. I say give me the English language with all its power, with all its beauty, with all its eloquence of diction, and I will trade you all the languages of the past and consider that I have immensely gained by the exchange. I know that we have the grand utterances of Cicero—for in that day they were grand—but Cicero would be a moderate orator of to-day if his oratory came to be compared with the eloquent diction and oratory of Webster, and he would be an immense loser if he were required or permitted to speak to the present generation. Now that may be a kind of sacrilege to talk so about the past, but some way it seems wise to uncover the glory which people are pleased to throw over antiquity and which inclines them to put it upon a pedestal so high and grand that all the nations feel like taking off their hats to bow in awful reverence before it. The past was a barbarism; to-day is the grandest country and the grandest civilization of all ages. [Applause.] Therefore give me the present and the common language as a drill and discipline, and carry it into the college as the language of the common people. [Applause.]

Come down to the practical fact. We drill with Latin and Greek, and many cannot write a straight English sentence to save themselves, and they cannot spell half their words correctly. In many and many a college we decorate a man with his degree of A. B. or B. S. who cannot spell well or dictate a respectable letter to his poor old mother at home. That is a misfortune. There is another thing that we want. While we have been talking about making men for practical life we have ignored physical education, physiology, a knowledge of ourselves. How can greatness come to a people unless we make strong men and strong women, and unless we understand how to manage and control ourselves? That is another strong point in this practical education, and so I might go on; but I must beg your pardon for continuing so long now, for I did not mean to make a speech. [Loud applause.]

Mr. LEE. I do not know exactly what to say after the discussion which we have just had, but I desire to impress the thought upon you that the principles of technical education applied to agriculture will succeed just as well, if loyally carried out, as those which make the soldier or the sailor or the doctor or any other profession of man. Why for four years does the cadet at West Point carry the musket and perform guard duty? Is it that he is to carry the musket and perform guard duty when he receives his commission? Why, sir, it is in order that he may show how the musket can be carried and how guard duty can be performed, and if this principle of technical education be carried out loyally, and brought to bear in agriculture, it will produce the same results, and as the graduates of West Point and Annapolis are accomplished soldiers and sailors so ought the graduates of our agricultural colleges to be model agriculturists. We have a model college in this country in Michigan. Sixty per cent. of the graduates of that college, who are alive, are engaged on the farm. The Mississippi college in modeling after that college has almost got equal results. We have sixteen graduates and twelve are engaged on the farm or kindred pursuits. At the Mississippi college every student has to work, and he is marked in his work, sir, as he is in his chemistry, or his botany, or his English. For a good hour's work he gets 8 cents per hour; for a half hour's work he gets 4 cents, and if he does not work he does not get anything, but he is compelled to go there just as he is to go to the section-room to recite. At the recent commencement exercises, out of twenty addresses there was not a solitary one which was a literary one, even the valedictorian of his class selecting a scientific study. The problem of that institution to-day is to furnish work to these students, and we were compelled not only to enlarge but to diversify largely in the last two years, to give work to the students. They actually demand the work, sir, and the institution for two years has been filled to its fullest capacity, and the indications are that next year two or three hundred students will be turned off from that institution.

It, sir, is a farmer's college. At the recent commencement nearly four thousand citizens of the State—nearly all of them farmers—were there. The grange of the State has not only indorsed the college every year since its organization, but, sir, they go with a memorandum to the legislature and say "we want you to give the university every dollar that they demand, and when you do that we want you to give the agricultural college all they want." In the last few years we have had $27,000 per year; the income from the fund has been only $5,000. (The income is $10,000, but half of that goes to the Negro Agricultural College.)

It is all a mistake that it is not honorable to work; every boy in the Mississippi college considers it honorable to work, and the boy who does not, who considers it disgraceful, is looked down upon. The trustees will not allow a boy to come as a pupil in that institution unless he is bound to be a farmer or follow some kindred pursuit. If he says I want to study medicine or law, they say we will turn you adrift.

So I think, Mr. President, that all that is necessary to make success of agricultural colleges is to follow out this principle of technical education, and follow it out loyally and just as it is done at West Point, at Annapolis, in the medical schools, in the legal schools, and (if I may compliment the Michigan and Iowa colleges) as in the Michigan Agricultural College and in that with which Professor Knapp is connected. It will win. There is not a shadow of doubt about it. The very heading, sir, of the agricultural law is to benefit agriculture and the mechanic arts. In some States the mechanic arts have precedence, but in the agricultural States the whole should go to agriculture, and everything should be made to bend to make it a success.

Mr. FAIRCHILD. Gentlemen, I hesitate somewhat to express my views to-night, because, like the Apostle Paul, I "count not myself to have apprehended," and yet, though I have given twenty years of my life, and more, to the problem—surely the better half of my life if not the bigger half—I have every day and every hour grown more sure of success in developing industry by study and labor together. Fifteen years I spent in the Michigan Agricultural College, with assurances that the problem was to be solved there. I can see before me three who might bear witness to the successful education of men without the classics (except in English classics), but with science and labor.

The last six years I have been at the Kansas Agricultural College, where there is a growth from year to year as much as we ought to expect, as much as we want; where every student of 400 does his quota of labor, and without the least shocking of his dignity, or her dignity either; where every atom of thought drifts in the direction of more usefulness to the world or better usefulness for the world. So I believe the problem is to be solved by the patient, constant care of those who will make it their study from day to day not innocent of faith. Paul did not refuse to go over to Macedonia, Cæsar did not stop at the Rubicon, simply because he did not see just where he was going to come out. We must have faith, and in every effort with faith there has been success. It is the doubters, it is the questioners as to whether they ought to do anything or not, that are always finding fault with their own success. It is the old maid children and the bachelor children who are well brought up and always perfect. None of us who have had long experience feel sure that any of these things can or cannot be done until we have tried. And all the theories, all the principles that may be laid down in black and white as to what the result of any given course of education may be, will have assurance by the larger experience of the different modes of thought.

Now, it is not necessary to jump at once to the conclusion that since skill is founded in repetition, in routine of simply one act, that therefore any industrial training looks toward that machine making of men. Not at all. We repeat occasionally for the sake of dexterity in mind as well as in hand. You don't think you have done thoroughly the work in arithmetic by simply demonstrating the fact that two and two make four and by showing it. You put your child through the problems in simple addition until he is dexterous in the working of those problems. Just exactly in the same way your young men who take hold of the farm, and your young women who take hold of the household, take hold of those things which make them dexterous. And so in every step of progress the child becomes the man of affairs by his constant handling of the things before him, and we simply keep up in the growth of our institutions, by the handling of the things before us, the spirit of usefulness which you try to keep up in your families.

Mr. LEE. Will you allow me to ask you a question? I would like to ask whether you think it would be better to separate these agricultural colleges from all others, or have them associated with the literary institutions?

Mr. FAIRCHILD. Mr. Chairman, that is a larger question to answer——

Mr. LEE. At our Mississippi University we had the entire fund for a time which gave us an income of $10,000. The first year they had three students, the second year they had two, and the last eight years they did not have a solitary student in the curriculum of agriculture.

Mr. FAIRCHILD. Mr. Chairman, I should answer by stating that the question involves two features; to separate and to keep separate are two different questions. I would by all means keep separate; that is, I believe that the tone of student life, the illustrations in the ordinary instruction, the very growth of the student, should be in the line of his industries. For example, in teaching chemistry let the teaching be filled with the things that a man is to handle in after life, and he will grow into familiarity with those things "as naturally as pigs do squeak." The same thing is true in the education to a profession. You teach your son in Cicero because you expect him to imitate Cicero when he comes to the arguing of questions of law; and in Thucydides because you wish him to imitate Thucydides in his presentation of historical questions. Thus you cause him to grow into his profession. So you teach a man in chemistry the things that grow out of his life; and with me, I would no more separate chemistry from agricultural chemistry than I would separate spelling from reading. I would have the chemistry full of agricultural chemistry; and if it is possible—if within the limits of the power of one man—I would have the master in chemistry the master in agricultural chemistry; and the force and the power which he will carry through his work will be felt the stronger, and the greater shall be the work accomplished. Not that it shall be all agricultural chemistry, not all technical by any means; but that the general shall blend into the technical everywhere; and nowhere would I separate the ideas of the useful from the general idea in education. I do not mean that we should boil all this down into the simple practical facts which may be used in every-day life, but I would have you make the application which you feel may be necessary in order that there shall be a reason for learning. And so it is with all this growth. I would not—I can notand preserve my-self respect—separate the thought of the useful in our education from everything we teach in literature and the classics. The traditions of the colleges, which are the strongest part of the education of your boys, should be in the direction of usefulness.

Now, as Professor Knapp has said, I have nothing against the classics. I was a tutor in Greek, and I held the honor of being recognized the best Greek scholar in my class, and I to-day enjoy the thought of Greek as much as any of you. I have recently been reading Memorabilia with my daughter, and if my son should want a course of classical study, I have not one word to say against taking it, but I would take it because it is useful.

Mr. GLENN. Suppose he enters your college and he wishes to take a classical course and don't propose to be farmer——

Mr. FAIRCHILD. Send him somewhere else. [Applause.]

Mr. GLENN. That exactly answers the point. My son, nineteen years of age, went through our course of study within one year, then chose a classical course, and he is now pursuing the classical course elsewhere. But having mastered the useful art of the mechanic, he is enabled now on his vacation to take the bench of the mechanic and earns his $2 a day. Another son, eighteen years of age, is taking his course with the same feeling of usefulness in his desire to learn; and if he stands at the printer's desk it will make him the more useful in the world.

Mr. CHAMBERLIN. I want to say just one thing. The gentleman over here [Mr. Curtis, of New York], was very much afraid about the boys working and feeling low; I want to say just one word about that, and let me tell you a little story. Some years ago I was in politics a little, and I was a little disaffected at some of our institutions, and I was a little troubled about the agricultural college. I had a little notion of attacking it, but an old friend of mine, who differed with me politically, but a personal friend, says, "Don't do it." "Well," I said, "if you will give me a reason, I won't; if you can't give me a reason, I shall." "Well," he said, "Mr. Chamberlin, it is the only place in Michigan where our boys can go and get a higher education where they are compelled to dirty their hands every day." I considered that a sufficient reason, and I let it alone.

Now, I want to say just here, I want my boys to feel that it is necessary for them to dirty their hands; that they must dirty them; that is, they must feel that labor is honorable. If they want to clean and wash them afterwards, or if they want to buy a manicure set—I think that is what they call it, don't they?—let them buy it. But the college is a place where they can go and see that labor is not dishonorable.

Mr. LEE. Mr. President, why does a young country boy who goes to West Point and stays there four years make, generally, an accomplished soldier? When he goes there he sees old Fort Putman frowning down upon him, which reminds him of his Revolutionary ancestors; he casts his eye on the plains and he sees a company of infantry or cavalry drilling; on the Hudson he sees the water battery and the military battery; he goes to the library and sees a portrait of General Scott, and he goes into the section room, where he has an ordinary lesson in grammar, and his instructor impresses upon him the fact that he is learning this grammar to be made a soldier. The same thought is impressed upon his mind whereever he goes. For four years he drinks in the military atmosphere; he does not turn around without being made to understand that he is studying to be made an officer of the United States Army. Why, if he has any of the elements of success in his character, he has a foundation on which to build; and if he has the opportunity he becomes a distinguished officer.

Now, Mr. President, I ask why, if you apply this same principle to agriculture, it won't work? Let the student go to the agricultural college and there he sees a beautiful lawn and beautiful trees just as you see in the front of this building, and the hedges of variegated evergreens; he goes to the stables and there he sees the finest animals; he goes to the barn and he sees the best grade of cattle; he goes to the field and there he sees the very best plow held by the very best plowman; he then goes to the orchard and there is the best apple orchard, and there are the best apples and peaches all planted and cultivated in the best way; he goes to the dairy and there he sees the milk prepared in the best way, and sees the butter made, and wherever he opens his eyes on that agricultural college ground he ought to be reminded by the surroundings that he is being raised for an agriculturist, for a farmer. Mr. President, this is as true as you are sitting in that chair. The principles of technical education, if carried loyally in agriculture, will bring us the same splendid results that it brings in other lines of education.

Mr. PEABODY. The time is late, and perhaps I should not say anything. It is a question as to what we are discussing, whether classical or scientific education should be considered, or whether manual training should be put into the common school and then, as a side issue, whether work is honorable or dishonorable, and whether labor should have a place in any institution unless everybody has to work. In the first place, it occurs to me that there is a parental consideration of the case. It is the parent who considers whether the son shall or shall not have a literary training. I remember sitting at the breakfast table one morning with a gentleman who turned and said to his boy, "My son, you will rise at 5 o'clock to-morrow morning; you will go to my study; you will find Milton's Paradise Lost; you will read the first canto, and after breakfast you will come to me for examination, and it will be well for you to have done your work correctly." You can judge as well as I how well the boy succeeded.

The question whether we shall insist upon work or whether work shall be voluntary, in any institution, depends upon a good many things. If it be found that the officers of the institution are not afraid of work, if any or all of them are willing to take off their coats and soil their hands with whatever needs to be done, that spirit will permeate all the members of the institution and they will be ready to work on the same principle. A lady wrote me that she wanted work for her son, but not menial work, such as sweeping or making fires. I answered her that so long as the chief justice of our college government (an important officer chosen by the students themselves) swept one end of the college building, we could not consider sweeping as menial labor. No honest labor which any student does at the University of Illinois is counted as menial or degrading.

If there is any work illustrative of the subject taught, any work which has any educational force, whether in the use of machinery, or of manual labor, or of any other form, then that work is valuable, and we never have any trouble in finding students to do it.

I remember an instance in an institution when the instructors were supposed to be "loyal to work." I saw teams going about dumping piles of manure and the boys were spreading that about. Now I could see no direct practical education in that operation. If a man had that to do he certainly would not do it himself. He would hire cheaper labor· That kind of work can be done by cheaper labor than his, or by mechanism; and the farmer's time and mind can be used to a better purpose. That to me seems to be the gist of the whole subject. If you can furnish work in any form at the file bench, at the blacksmith's anvil, at the turning lathe, in any one of the thousand ways where the work has instructional power in it, so that the boy will feel that he is learning something, that he is coming out of the day's work with more power, more knowledge, more mental or even more physical force, that he has obtained some practical good—let him feel this and he will want to work; but if the idea is simply to use up the time, to do something that can be done better in some other way, he has no liking for it and will avoid it if he can. I think he ought to.

I have heard considerable said on this floor, by way of illustration, about West Point and Annapolis. I want to say that I cannot see any relevancy whatever to the question. The boys at these institutions have an assured thing of it, and throughout their course they know the pay which they then draw and the salary they are to get when they graduate, and the day when they will begin to draw it. That is reason enough why they are upon a different plane from the agricultural students. Provide, if you can, such an incentive to your agricultural course, and your boys will be quite as earnest as those at these institutions of the Army and Navy.

There are two classes of young men who go to the agricultural colleges. The one composed of such men as the young man to whom my friend (Mr. Knapp) referred. They know that they have an agricultural business behind them which they can take up out of their fathers' hands and carry on. Such young men will rejoice in an agricultural education. They will work at it zealously and when they are through will return to the farm. We have plenty of such illustrations; but what are you going to say of the poor boy of the Northwest who has not such an advantage when he comes, and will not have such an advantage when he goes out. He has no money to buy a farm, no money to hire one, and having no farm, that is to come to him——

Mr. WOODHULL (interrupting). We have just such men as foremen of our farms.

Mr. PEABODY. I think I know of just such men who have studied diligently and faithfully and would like to find just such places as that, but they cannot find them, sir. When our former Commissioner, Dr. Loring, made us a speech one day in which he told us of an hundred such places as foremen for graduates in agriculture, I wanted to ask him where he could find one.

Mr. KNAPP. I would like to place twenty. [Laughter.]

Mr. PEABODY. I venture to say you cannot do it.

Mr. KNAPP. Well, I can.

Mr. PEABODY. Well, I know of young men who have advertised over and over again. I read the agricultural papers and have talked with agricultural editors, and they tell me of the same thing. You cannot find that business for any extended number of persons that will pay the boys $25 a month, while other pursuits will pay them from $50 and $60 to $125.

Mr. KNAPP. I will sign a good contract to-night to place ten.

Mr. PEABODY. Well, you may have some special means of doing it, but I still assert that it is not the normal condition of things.

Mr. GLENN. I have made a great deal of inquiry in that line. I obtained a few places, but I find it right difficult to locate them.

A DELEGATE. I have been looking for some years for such a place as that—as foreman of a farm in the Northwest. I have not found it yet.

Mr. PEABODY. There are a great many other questions which naturally rise out of this, but the time is late and I will not detain you further.

Mr. KNAPP. Mr. President, let me answer that one point. Ex-Governor Dysart, of Iowa, a brother of the honorable S. Dysart, one of the great stockmen of Illinois, said to me at my house the other day, "Can you furnish me a good foreman? I have 1,000 acres of land, all in good condition, as good as any in the world. I love the old farm, for I made all of it, but I am not able to carry it on. My sons are away for themselves, and I want some graduate of an agricultural college who can come to me and carry on my farm, keep my accounts properly, make the necessary reports, and so on." Now, I say, my young man, there is the place for you if you understand farming, if you have a mind trained in agriculture, &c.

Mr. GLENN. Is that place open yet, sir?

Mr. PEABODY. If it is I have the man who can fill it. [Laughter.]

Mr. KNAPP. I will tell you where the trouble is—these young men don't know how to handle such a farm successfully; they have not the necessary experience. That is the difficulty.

Mr. TAYLOR. Mr. President, I move that we adjourn.

The motion was agreed to; and accordingly at 10 o'clock and 55 minutes p. m. the convention adjourned.

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JULY 9, 1885.

The convention was called to order at 10.30 a. m., the president in the chair.

The PRESIDENT. I have one or two requests to make this morning; one of them is that I hope the members will register their names on the book which my private secretary has here, so that each delegate will receive a copy of the proceedings of this convention when published. Give your name and post-office address, each of you.

I will also state that the only railroad company that I could make arrangements with to return passengers at reduced rates was the Baltimore and Ohio. Any person who has come over this road to attend this convention—any delegate to it—can be returned over that road, as far as it goes, at one-third rate.

Another notice I will give: That immediately after the adjournment this morning, one of our photographers in the city desires to obtain a photograph of a group of those who are here in attendance. I make this announcement now and hope that gentlemen will remain until the recess. If any of you afterward desire to buy one or more of them, it will be a matter of choice to do so. We are to be grouped, I believe, on the north side of the building.

In order to obtain reduced rates on the Baltimore and Ohio Railroad it will be necessary to obtain a certificate from the secretary of the convention. I do not know that I have anything further to say in reference to the trip to Mount Vernon. If any gentlemen wish to visit that place to-morrow, leaving here at 10 o'clock and returning at 3.30, tickets can be obtained here of Dr. Taylor, at 75 cents for the round trip.

This afternoon, immediately after lunch, the members that desire to visit the President, and to be introduced to him, will assemble in the east room of the White House at their leisure; this is Cabinet meeting day, and the President could not tell me exactly as to whether he would be ready promptly at 2, or half past 2, or perhaps as late as 3, but I suggest that you had better be there at half past 2 o'clock if you can.

I have been instructed to appoint a committee on legislation, a very important committee. I have felt considerably embarrassed in selecting that committee, but I have appointed Messrs. Atherton of Pennsylvania, Willits of Michigan, and Lee of Mississippi.

The committee on resolutions is ready now to make a partial report. The first business in order will be a report from that committee.

Mr. DABNEY. The committee on resolutions beg leave to report as the first business of the morning the following:

*Resolved*, That the relations of agriculture to meteorology are so intimate that the operations of the United States Signal Service should be fully demonstrated at every agricultural college. To this end, the convention heartily indorses the suggestion of the Commissioner in his address, and requests him to endeavor to secure the establishment of a signal station at every agricultural college, now or hereafter established under national endowment, and if it be found impossible to accomplish this important matter through the War Department or the Chief Signal Service Officer, the Commissioner is requested to refer the subject, with his recommendations, to the committee on legislation of this convention and then to co-operate in securing necessary legislation.

The PRESIDENT. Gentlemen, you have heard the report of the committee. Are there any remarks to be made upon it? The question is upon the adoption of the report.

Mr. DABNEY. The committee would be glad to know, as a matter of information in projecting this matter, what relations, if any, the signal officer so located could have to the faculty or to the employés and corps of instructors of the various agricultural colleges—what privileges and other employment might be obtained to facilitate the matter—and a few other facts, such as the department or rooms for the purpose, so that all the details could be presented by the committee on legislation, and that Congress or the Signal Office might have every assurance of the facilities their officer would have. We should like to hear from some college presidents on this matter.

Mr. PEABODY. We have had, at the University of Illinois, a little experience on this topic, and I will take but a few minutes to relate it. In the fall of 1880, after a considerable correspondence with the Signal Service department, a sergeant in charge appeared, to establish a station with us. We furnished him with one of the best rooms in our building; we gave him what he claimed to be an unusually good opportunity for the exposure of his instruments; we gave him, in short, everything he asked for. We were a mile from the telegraph station. We built a line from his office to the telegraph station, but for a year there was no authority from the general office either to send out or receive telegraphic communications, and all of his communications were sent by mail to the Signal Office at Washington. After considerable labor, I succeeded in getting an order passed by the central office that observations should be sent out, and they were so sent for a year and a half or two years; but we could not get any order by which the observations should be sent to the university so that they could be distributed or published. Indeed, I hardly know what we should have done with them had they been sent, as there were no daily papers to publish them.

We had an apparatus put up on our highest tower, a mast, from which by means of signals certain facts could be communicated to a small radius of the immediate vicinity; but Congress cut off the appropriation and the service was withdrawn. We parted with the gentleman without many regrets, for we did not see what we had received for the considerable outlay we had made. It was also observable that the observations which we obtained at our station were almost identical, day after day and week after week, with those found at Springfield, in the center of the State, and I really did not see any very strong reason that I could present, aside from the general proposition of yours, sir, for the re-establishment of the signal service at Champaign, either for the service or for us. The man they sent us was of no use to us in any other capacity than that of an officer to pass through the routine of the service. Except in the way suggested, I do not know of what service he could have been to an agricultural community.

The President. One question: Could not some professor of your college have performed the duty which he performed?

Mr. Peabody. Part of that duty was performed before he came. It is, however, a pretty serious task upon any man to be bound to an office constantly and take such a series of observations and to make them really of service, as any one knows who has tried that sort of thing.

Mr. Alvord. It was not expected that the introduction of this resolution would lead to any extended debate, and I certainly would not occupy a moment but for there being two sides to the subject. Allow me to relate, in a very few words, our experience at Houghton farm. While we have no claim whatever upon the Government for any assistance in this or any other matter connected with our work, we have represented directly to the Chief Signal Officer of the Army that we were interested in meteorological observations; that we regarded the study of meteorology as all-important in connection with our agricultural experiments, and we found that officer was entirely ready to second our efforts. The Signal Office provided us, without any bond whatever, with a complete set of meteorological instruments; put us upon their list as a volunteer observer, and constantly communicated with us; furnished all their publications, general and special. Any inquiries which we make as to special information which the office has are promptly answered, and needed instruction given when any of the young men who conduct the observations get into a tight place. Now it costs a good deal to simply provide a man capable of making the observations.

We not only take observations three times a day, but we take hourly observations thirteen hours in the day, and every five days twenty-four hours. This takes a good deal of time, when we handle, as at times, twenty or thirty thermometers. It is of just as much importance for us to know the temperature at the surface of the soil, just above the surface of the soil, and throughout the root area of the soil, as it is the indefinite temperature of the moving atmosphere some distance above the soil; and we found that we were already, in co-operation with others, interesting the central office here in the study of temperature of soils as bearing upon the growth of plants.

This proposition to establish such a station at every agricultural college may lead to most important results in agricultural education. Certainly in our experience, although we deal with but few young men, we find that this is one of the first things to attract their attention, and they naturally become interested and accurate observers in a short time; that they, in other words, see the point at once, of the importance of the relations between meteorological phenomena and agricultural progress. It all depends, of course, upon having the right man in charge. We all know how, in some of our agricultural colleges, the wrong man at the head of the military department has made it worse than an abuse and a nuisance, while at other places the right man introducing it has made it one of the leading features of the institution. Just so with this: you have got to pick your man, and if you do not get him at first, ask that he be changed. But the mere fact of having a complete set of instruments at the institution under the charge and responsibility of some one outside of your organization, who can manage them and report directly to Washington, and of getting the advantage of showing them and of their being seen and used by the students, cannot but be very valuable in its educational effects. This aside from the value of the observations themselves, which may be extended beyond the sphere which the Bureau itself cares for, and into lines much more closely related to our agricultural studies.

Mr. NEWMAN. As the inquiry has been made, sir, in reference to the connection of the Signal Service with the colleges, I will state that one of the professors in our college—the Agricultural and Mechanical College in Alabama—is chief of that department in the State. He was teaching meteorology in connection with this chair before he was appointed to that position. He is in daily communication with the Signal Service Office; he has a system of flags which are hoisted every morning at different points in the State, which are in telegraphic communication with the college, and, receiving a telegram from the central station at Washington, each morning, he immediately telegraphs to his subordinate places in the State, and these signal flags are raised. The farmers all over the State are profiting by that warning. I, sir, have found them of incalculable value to myself in conducting the experiment stations. I have often changed my work and my orders for the day in consequence of the warning given by these flags. We have a double set of flags, indicating the temperature and the probability of rainfall. The board of trustees, at their recent meeting. made an appropriation for the purpose of having his monthly reports disseminated through the State; he is afforded every facility by the college authorities and every facility, so far as I know, by the general Signal Service Office.

A DELEGATE. Who pays him ?

Mr. NEWMAN. He is paid by the central office, I think—by the War Department. I am not posted, but he has recently been allowed a clerk by the War Department, to assist him in this work. He seems to have been highly appreciated by that Department, and is certainly highly appreciated by the people all over the State.

Mr. FAIRCHILD. The Kansas Agricultural College had, some years ago, some experience in the use of a Signal Service officer, with an attempt to make him a part of the corps of instruction. The attempt was a failure, or the officer was a failure, as Mr. Alvord has suggested might be possible. The fact is, however, that the observations are a part of the necessary instruction in any course that undertakes full instruction in agriculture, and it seems to me that no course in agriculture is complete, that does not provide, along with its agriculture, chemistry and meteorology—something that looks to daily observations, as intricate as possible, as complete as possible. This college has made the attempt and has successfully made it, to keep full observation for the past twenty-five years, since the very foundation of the college, and this is a matter of daily report with us for generalization as well as for daily care.

We have not been able, however, so far, to make any connection with the Signal Service Bureau except to report to them; we have monthly reports and could, I suppose, have the daily reports if we were in daily communication with them. It seems desirable to us that we should have full control of the station that should be located with us, in order that we may bring it into the general arrangements of the college. The officer is likely to feel that he is independent of all the other machinery of the college unless he is directly in sympathy with the college.

Mr. LAZENBY. I would like to say just one word in regard to meteorology in connection with the university and experiment station in Ohio. We have in the State of Ohio, as perhaps some are aware, a State meteorological bureau that is supported by a sum appropriated, the same as is our State experiment station. The professor of physics of the university is director of this station. It has been in operation now for some three years. There are forty local stations where there are volunteer observers of instruments in different sections of that State; and these volunteer observers report monthly to the director and we have published then a monthly report. I can say that this bureau has been one of the most useful adjuncts of our experimental work—of this work at the agricultural experiment stations—and many of the experiments have been carried on in chemistry this last season in connection with it. We were enabled to make some very careful lists as to the difference in temperature over ground that was mulched, and not so mulched. This has a practical bearing. For instance, we are very liable, in Ohio, to have frost about the time strawberries are in bloom, and we found some very interesting facts in connection with the temperature at that period. I may say that this bureau works in harmony and is very intimately connected with the Signal Service, and we have been promised this year a man who is to be detailed there. General Hazen has made that promise. He is to work on some special work in which the Signal Bureau is interested. This, as I understand it now, is to be the study of soil-temperature mainly, and the observations, it is hoped, are to be by electro-thermo methods.

Mr. McWhirter. I have had charge, sir, of the weather bureau of my State (Tennessee) about two and a quarter years, and I am gratified to state that it has proved of much service to that class of farmers and agriculturists living near our cities and towns in the State having daily papers; but I went before our legislature at its recent session, and asked for an appropriation that might enable me to extend this service to agricultural neighborhoods of the State. I only asked the small sum of $1,500. The railroads of my State, the trunk lines, had agreed to utilize their express trains in carrying signals during the day, and to have their operators at all telegraph stations to erect lights by night and flags by day, if I would agree to furnish the flags and the oil. Our legislature declined to make the appropriation. There were forty-nine farmers in that legislature, and forty seven of them opposed it. They said that they were not deriving any service whatever from the Signal Service as now conducted; that these forewarnings reached them about a month after they were made. It is true my reports, as you are aware, are sent out monthly. By the way, I left my assistant tabulating my report for June when I left on Monday last, and that will be published and go out to my State by to-day's mail. Those observations were made during the last month. I have about forty-two stations, and as my worthy friend here (by the way, one of our observers, too, or was until recently) says, we have as faithfully endeavored to carry out the plans as our means and our talent would enable us, and we thought we were making pretty good headway; but since the rebuff in our legislature we have concluded to abandon it; that is, unless the General Legislature can give us the assistance we need to reach all the agricultural neighborhoods. But this does not refer to that report. That report refers especially to your agricultural colleges, and I think it is very important. Professor Alvord reflects my sentiments. I think every agricultural college in this Government ought to be interested, sir, in the establishment of a Signal Service station at its college, and placing it in charge of the proper man; unless it is placed in charge of the proper man, it will be of no service whatever.

Mr. Armsby. I was not here when that resolution was introduced; but, as I understand it, it refers to the establishment of meteorological stations at the agricultural colleges. I am glad of any kind of a discussion on that subject. Perhaps it does not properly come under the resolution. There is one point that appears to me to be very important, and that is the collection, by means of these State weather bureaus, of statistical information regarding the meteorological condition of their several States. The mere matter of sending off daily weather predictions, or special weather predictions, and all that, is doubtless important; but it appears to me to be the least valuable part of the work of such a service. By a system, such as I understand they have in Ohio, daily observations are taken, are tabulated by the service, and reported monthly. Of course any one monthly report will not be likely to be very valuable, but it seems to me that exceedingly valuable data would in course of time be accumulated regarding the climate of the State for successive months, seasons, and years; and therefore, sir, it seems to me that if we can have meteorological stations at agricultural colleges it will be an exceedingly desirable thing. The question of subordinate stations throughout the State ought also to be taken into consideration.

Mr. Fernald. I wish to say a word relative to the matter of meteorological observations——

Mr. Atherton. May I interrupt to raise a question of order? I am very sorry to interrupt such a discussion, and only rise from duty. At the last session yesterday afternoon it was agreed that the time this morning should be first given to the report of the committee on order of business which presented for discussion the subject of co-operation with the Department on the part of the several agricultural colleges and institutions. That was laid down distinctly as the first order of business. I think that this resolution was allowed to come in with the idea that it would not open the whole subject to debate, and I feel very much disposed to ask that it now be postponed for further consideration, if need be, after the order of business has been regularly entered upon and disposed of. I feel inclined to move the previous question so that we will cut off further debate, unless this can be done; and therefore I suggest to President Fernald that he move that this question be set down for a definite time. I do this to facilitate business and carry out the order already passed by the convention.

The President. I would suggest that debate on the question will be over in a very few moments and I think that Mr. Fernald had better proceed now.

Mr. Fernald. I will take but a moment's time, sir. So important has this matter been considered by the college of my own State (Maine) that observations have been taken from the organization of the institution, or very soon after. The institution was organized in 1868, and observations commenced January 1, 1869, and have been continued to the present day; and we have found them not only of very large service to the college but also to the State. Reference is very frequently made to them, and inquiries come continually, by letter, requesting the observations on certain days, and they are regarded all over the State as of considerable importance. We have observations also since the experiment station has been established. Orono having no independent service of its own it comes to the college for barometical observations especially, and frequently for other meteorological data. The point, however, I wish to make is this: It seems to me that the matter of establishing Signal Service observations in connection with the Department at Washington will be one of very great utility. That these observations should be taken with that degree of completeness which such an organization will secure and as the resolution contemplates (I was not present when it was read but I have gathered the force of it from the remarks made) seems to me to admit of no doubt. It is a subject which may properly engage the attention of the members of the convention, and anything we can do to give an impetus to the project of establishing these Signal Service stations in connection with the Signal Service Department at Washington should be done. I believe that the agricultural colleges will largely profit by such a system and that it will prove of very great utility, not only from the intrinsic value of the observation but also as an educational factor in the institution.

Mr. LEWIS. I would like to have the resolution read again.

The secretary again read the resolution, and it was then adopted.

Mr. LEE. Quite a number of gentlemen from other colleges have arrived, and I would suggest that their names be taken down, so that they may engage in any discussions that we may have.

The PRESIDENT. The names of gentlemen who have arrived, that have not been entered on our lists, can now be recorded. It will take but a moment.

Mr. ALVORD. The committee desires to report the subject of co-operation as the first to be considered this morning, and their intention of moving that this session be continued until 2 o'clock, with a recess until 4, in order that the visit to the President may be made at 3 o'clock: that the convention then assemble at 4 o'clock, and that we then press on with the business which is considered important. The committee also recommends that the subject for presentation, as soon as this subject is disposed of, shall be the condition of agricultural colleges, a subject which was opened last night by President Willits' paper on Industrial Education. The committee recommends also the adoption now of this resolution: that upon any subject presented before the convention, remarks be limited to five minutes to each speaker, and that no person be allowed to speak twice upon the same subject while others desire to occupy the floor.

Mr. WOODHULL. I object to that, because no one can present in five minutes what he wishes to say upon so important a subject. I move to amend by striking out "five" and inserting "ten," so that the limit shall be made ten minutes. Five minutes is simply gag-law.

Mr. ALVORD. The committee accept the amendment.

The resolution, as amended, was adopted.

Mr. ALVORD. The committee now presents the following:

Whereas one principal object of this convention is the establishment of closer relations between the Department of Agriculture and all institutions systematically engaged in active labors for agricultural progress; therefore,

*Resolved*, That in the opinion of this convention the first practical measure to secure co-operation in fulfillment of the admirable suggestions of the Commissioner of Agriculture is the creation of a bureau or division in the Department of Agriculture, supplied with the necessary clerical force, which shall be the special medium of intercommunication and exchange between the institutions intended to be represented by this convention and the central office in charge of the details of this general plan of co-operation.

*Resolved*, That this convention respectfully recommends to the Commissioner, as one of the most important functions of the proposed bureau, the compilation and publication of a periodical bulletin of agricultural progress, not less than quarterly, and an annual report based thereon. This bulletin should contain, in a popular form, ready for the use of the people and the press, the latest experiences and results in the progress of agricultural education, investigation, and experimentation, in this and in all other countries.

*Resolved*, That as a necessary part of the intended co-operation of schools and of experiment stations here represented regard themselves as bound to make definite plans for supplying said bureau with such regular reports of their operations as may be called for by the Commissioner; and that the Commissioner be requested to provide, as far as needed, uniform blanks for such reports, and these institutions further regard themselves as obligated to promptly respond, as far as practicable, to calls from said bureau for information on special topics which the Commissioner may need at the central office.

And the committee ask that Mr. Woodhull of Dakota, and Mr. Thorne of Ohio, be successively given the floor in connection with this subject.

The PRESIDENT. And if you had added a resolution that Congress be asked to make sufficient appropriations to carry out the intent of those resolutions it would have been much better, because we are now limited in funds.

Mr. WOODHULL addressed the convention. He said:

*Resolved*, That it is the opinion of this convention that a bureau of information and exchanges should be established in the Department of Agriculture.

## THE CREATION OF A BUREAU OF INFORMATION AND EXCHANGES IN THE DEPARTMENT OF AGRICULTURE.

In his circular of May 6, 1885, under which this convention is assembled, the Commissioner of Agriculture indicates:

First. The absence of anything like intelligent association or co-operation between the Department of Agriculture on the one hand, and the several agricultural colleges and experiment stations on the other, or of association and co-operation between the colleges or experiment stations, respectively.

Second. He indicates briefly but clearly the advantages to be derived from such associated action, if it could be secured, and the discussion this morning certainly confirms this unsatisfactory view of the relations between the colleges and the Department.

My object is to present in as succinct and practical a manner as possible an outline of organization, which, if properly developed, will, I think, insure this co-operation and association of effort between the Department and the colleges, and also promote a higher spirit of association among the colleges themselves.

If the Commissioner's circular be analyzed, it will be found that the present unsatisfactory condition of Department and college relationships is due primarily to the want of an adequate channel of information and communication, and consequently that the first step in establishing the relations upon a proper basis must be the creation of such a channel of information and communication. I think that at the outset this channel of information and communication could be created without much additional expense to the Department, by employing certain existing forces within the Department, although the incidental development of departmental usefulness will undoubtedly necessitate hereafter somewhat increased appropriation.

I am aware of the delicacy of discussing Department organization, and shall endeavor to keep within the bounds of courteous discussion while presenting clearly the idea of organization suggested. The object must be clearly perceived and constantly kept in view, viz., the creation of a channel of information and communication between the Department and the colleges, and one which the colleges themselves may employ in communication with each other. Nor is there occasion in devising the machinery for this system of communication to indulge much in experiment. Wherever the experience of the Department can be availed of it should be done. So also should the operations of the other Departments of the Government be studied for models of organization.

Fortunately much of the ground has already been gone over, fortunately a model of organization is ready at hand, and fortunately the Department of Agriculture is familiar with certain phases of its operation and indeed participates in its advantages.

The model of organization to which I refer is the International Bureau of Exchanges of the Smithsonian Institution.

The Department of Agriculture already avails itself of the advantages of this bureau to maintain its relations with foreign agricultural departments and associations, while at the same time it employs a salaried agent of purchase and selection in Europe, in order that the library of the department may be enriched by the procurement of the results of scientific experiment and discovery unattainable through other means.

The Smithsonian bureau of exchanges has been in operation for a number of years, and its method of procedure, under the efficient management of the chief of bureau, Mr. Boehmer, has been developed and systematized, so that it might be taken as a working model by the Department of Agriculture. It does not, however, cover all the ground which it is desirable should be covered by the Department of Agriculture, but so far as the function of exchanges is concerned I do not think, after a somewhat careful study, that its method could be improved upon.

To indicate the extent to which this instrumentality is availed of it will be sufficient to say that it has grown to be the channel of communication between forty-two hundred foreign and eighteen hundred American societies, beside being the regular governmental channel of communication between the governments of forty-four nations and self-governing colonies and the United States respecting the interchange of government publications, the Department of Agriculture participating in the advantages offered by this bureau as stated above.

By the courtesy of the chief of the bureau, who has allowed me to consult the advance sheets of his forthcoming report, I may further state, as indicating the value which scientific societies and national governments attach to this work, that during the year 1884 the bureau received and distributed—

| | Packages. |
|---|---|
| For foreign transmission from Government Departments | 7,476 |
| Smithsonian Institution | 4,102 |
| Scientific societies | 6,961 |
| Individuals | 327 |
| Total for foreign transmission | 18,866 |
| For domestic transmission | 7,967 |
| For government exchanges | 38,337 |
| Total for the year 1884 | 65,170 |

The exchanges for this year, I am informed, will show an advance upon the work of last year.

Here, we see, is an elaborate and thoroughly organized system for the exchange of information. That it is appreciated and availed of by governments, societies, and individuals the records of the Smithsonian bureau of exchange show; that in its organization may be found a model for the Department of Agriculture cannot, I think, be doubted.

Much the same conditions exist at present in respect of the relations of the agricultural colleges and experiment stations, which, until the creation of international bureaus of exchange in the United States, France, and other foreign nations, existed respecting the relations of the various scientific bodies of those countries and indeed respecting the actual government work of distributing formulated and published information issued by the respective governments themselves.

After much individual labor, and after several international congresses had been held, this almost perfect system for the exchange of information was devised. Conditions of undirected, unsystematized, and purely individual effort and experiment existing in the case of the agricultural colleges, as the Commissioner of Agriculture points out in the circular of May 8, I would deem eminently proper that a bureau somewhat similar in object and scope and constitution to the international bureau of exchanges should be created—and if created, where better than in the Department of Agriculture?—which bureau should serve as the common channel of communication between the several agricultural colleges and experiment stations, and between the Department and the colleges and stations. Should such a channel of communication be created the various colleges and stations throughout the country would be kept informed of the work which each was carrying on. The course of experiments in each college or station would be open to the immediate consideration and information of the Department and of all the other colleges, and in addition a direct saving of force and a higher and much more efficient application of force in experiment and study would be secured.

To indicate briefly, and only suggestively—because, if the idea be approved, the working out of the details may be safely left to the Department—the first course of operations of such a bureau would be to institute a thorough system of interchanges between the various agricultural colleges and experiment stations; that is to say, reports of experiments, records of observations, projects of instruction or management would be interchanged among the various colleges and stations and the Department with the result of informing each of the methods and systems and discoveries of all the others.

That such an interchange would result in improvements in methods and systems, in an economy of force in the conduct of experiments, and in the determination of principles will be apparent, I think, to any one who listens to me. That the chief result which the Commissioner has intimated as desirable will be accomplished by this system goes without the saying, viz., that it will create among the colleges an *esprit de corps*, which will result in their associating themselves more closely together to the end of the accomplishment of the object which Congress had in view in their creation, viz., the improvement of the agriculture of the country.

I therefore have the honor to recommend the creation in the Department of Agriculture of a bureau of information and exchanges upon the lines herein marked out.

I do not pause to discuss, nor is there time for me to discuss, the relations which this new bureau should bear to those already existing in the Department, viz., the chemical bureau and statistical bureau, which are in fact information bureaus. But without going into details, I may be permitted to say that I can see no possible ground of conflict between them. Indeed, I think it would be possible to associate or co-ordinate the work of these various bureaus to the end that the information formulated by the Department itself, should be in the line of that afforded or presented by the various colleges, or rather, acting in harmony through the proposed bureau of information and exchanges with the various colleges and experiment stations, and receiving in the bureau of information and exchanges the results of their work, the scientific work of the Department could be given wider scope and influence than at present, by either directing much of the work of the colleges or by supplementing their work by its own.

Under such a plan of co operation between the Department and the colleges it is seen how in fact as well as in name, the Bureau should become a center of information as well as a channel for the exchange of information.

Mr. THORNE. My paper was prepared before hearing the resolution. The second resolution covers a little different field from that of my resolution—a broader field. The paper was prepared to discuss the preparation of press reports for popular use, and is prepared from the editorial standpoint with a view that ultimately the work of our experiment stations must reach the people through the medium of the agricultural press.

## THE PREPARATION OF EXPERIMENT REPORTS FOR POPULAR USE.

The work of the State agricultural experiment stations manifestly embraces not only the investigation of questions relating more or less directly to the work of the farm, but also the publication of the results of such investigation in such manner as most to benefit the largest number of those interested.

It is very properly maintained that a large portion of the work of these stations should be the investigation of natural phenomena whose relation to practical agriculture will not be comprehended by the average farmer, and that many of the methods necessarily used in such investigation would be utterly impracticable in ordinary farm management; but the directors of these stations are not permitted to forget that there is also a very urgent call for work which shall have for its object the establishing of facts which the farmer of ordinary intelligence may comprehend, and that the methods employed must be such as he may use in his own field or stable.

We do not regard it as an unmitigated misfortune that the present financial condition of our experiment stations renders it unwise to neglect this call. All human experience shows that it is only when theory and practice go hand in hand that the greatest and most permanent advancement is achieved. The discussion of this point, however, is foreign to my present purpose. It is sufficient to recognize the fact that there exists an imperative necessity for giving frequent evidences that the officers of the experiment stations are at work, and for putting these evidences in such a shape as to be appreciated by those who must finally decide whether the station shall continue or abandon its work.

In our inquiry for means of meeting this necessity we are immediately confronted by the equally urgent necessity for so recording the results of the experiment station work that they may be permanently available to the scientific investigator, for none know so well as professional experimenters the unreliability of single observations, and the necessity for the comparison of the results of many tests made in different seasons in different soils, or with different animals, before trustworthy conclusions may be reached.

This permanent record, therefore, becomes the first work of the experiment reporter; first, in order of time, because it necessitates the immediate recording of every step in the progress of the experiment, and of every fact noted during the experiment which may have any probable bearing upon its results; and first in importance, because it is only from the complete and full report thus made that the scientist can safely make deductions. But a report of this character is often too elaborate for the ordinary reader. The farmer is a very busy man, and one who reads but little. If a subject relating to his work be discussed with clearness and reasonable brevity, he will follow it out and understand it as readily as men of equal intelligence in other callings; but he has little of that training of the intellect which enables the scientist or jurist to follow an idea through a maze of evidence, sift out the irrelevant, and co-ordinate that bearing directly upon the subject in hand.

Nor can the farmer be blamed for this intellectual condition. His calling is only just emerging from the status of a handicraft, and even yet so large a portion of his time must be spent in manual labor that one cannot expect him to follow out the reasoning of the scientific specialist with that keenness which would be expected of one engaged in more intellectual pursuits. We freely admit that farmers read and think far too little, and depend too much upon brawn and mother-wit; but the necessity is upon us of taking them where we find them and making ourselves as familiar as possible with their habits of thought. By so doing we may gradually work in that leaven which shall eventually raise the farming class to an intellectual level sufficiently high to appreciate the more abstract portions of agricultural science; but so long as we continue to fire over the heads of those for whose benefit our work is especially intended, just so long will there be a great and widening gap between "scientific" and "practical" agriculture.

Regarding the scientific aspect of the preparation of experiment reports, we have no special criticism to make upon present methods. As already said, these reports, for scientific purposes, should embrace every fact that can have any probable bearing upon the subject under investigation, aside, of course, from such facts as are already the common property of scientists. It is scarcely possible to fill such a report too full, of statistics, especially, but a report drawn up after this method is often utterly unfit for popular use, because its very completeness adds a large amount of matter of various degrees of relevancy, while the unscientific reader is not prepared to assign its due weight to each of the several factors employed, and hence becomes confused and unable to appreciate the true value of the experiment.

It would naturally be expected that the agricultural press should become the final medium for placing the results of the work of the experiment stations before the people, and it has no doubt been a surprise to some of our professional experimenters that so little of their work has reappeared in this medium. There are several reasons for this apparent neglect on the part of the press. In the first place there seems to have been no systematic effort on the part of many of the experiment stations to forward their reports to the press. In some cases, probably in most, there has been no provision made by the States controlling the stations for publishing their work in any other shape than that of the annual reports, and these, of necessity, assume the bulky form necessary in a permanent record of the station's operations, and generally appear too late to be of any practical use during the current season, consequently they are laid aside, perhaps with the intention of extracting from them when the topics discussed again become seasonable, but by that time there is a pressure of new and fresh matter, and the station reports are either forgotten or "crowded out."

Moreover, these reports, as stated, are not generally adapted to the purposes of journalism; they abound in statistics and technicalities, and these, the well-informed agricultural editor knows, constitute a form of literature not yet fully appreciated by the average farmer. It is true it is the editor's business to condense and rearrange such matter and adapt it to the requirements of his readers; but the fact is that a very large proportion of our agricultural editors have not that scientific knowledge necessary for performing this work to the best advantage; while all of them are hard worked, all are under a constant pressure of applications for admission to their columns, and, to tell the whole truth, some of them at least are not free from the vice of laziness.

You will understand that we are not an apologist for editorial shortcomings in these respects. We have as hearty a contempt as any man has for the ignorance, cupidity, and unfairness which characterize too large a proportion of our agricultural journalism. The best that can be said of it is that it is not quite so bad in these respects as political journalism, and that is not saying much. Nevertheless, the agricultural journals are here, and until we can infuse into them new life and intelligence by filling their editorial chairs with men trained under the pure light of science, and by placing in their business management men to whom truth is of more value than money, we must be content to take them as we find them and make the best of them.

Even in the case of those stations authorized to issue more frequent bulletins, the obstacles noted have not always been overcome. In some cases the bulletins have been too lengthy and too full of technicalities for the use for which they were designed, and the labor of bringing them into compass has been so great that they were thrown aside entirely. In other cases the bulletins have been sent to but a small number of journals, with the expectation, probably, that other journals would copy from those first favored. Sometimes such expectations have been realized; but it is not more rational in agricultural than in news journalism to suppose that such an arrangement would be cheerfully acquiesced in by the journals overlooked. The petty jealousies between rival publications constitute a factor in this question that we cannot disregard, however much we may contemn it.

There is still another phase of this question that cannot be overlooked: a very great deal of the work thus far done on our experimental farms has been extremely unsatisfactory.

In too many cases time and materials have been frittered away in desultory experiments which prove nothing whatever, and which have a tendency to mislead rather than to instruct. The so-called tests made at one station are nullified by those made at another; even those made at the same station during different seasons are contradictory. The reason for these discrepancies is to be found not so much in the variations produced by different seasons and different locations as by the failure in each individual test to make sufficient provision against the natural variations of soil which are shown in every field, or those individual idiosyncrasies shown by every animal.

These facts have not passed unnoticed by the agricultural journalist. That they have not called forth louder criticism is due mainly to the remembrance that scientific agricultural experimentation is yet in its infancy in this country, and that men are having to train themselves in new methods with little help from previous experience. But the discrepancies noted have made both journalist and farmer a little cautious in accepting a theory which may be at variance with former practice, because some station or college experiment seems to support such theory.

These are a few of the more conspicuous obstacles in the way of the popularization of experiment station work; but here, as usual, it is easier to point out the obstacle than to show the best means for overcoming it.

On one point we think all practical experimenters will agree, and that is that there should be greater harmony in plan and method in the work of the various stations. Each station, of course, will find some lines of work especially adapted to its particular environment, but there are other lines in which several or all the stations may co-operate to great advantage. An experiment in wheat culture, for instance, if carefully made in Ohio alone, may produce valuable results; but how much more valuable if it be simultaneously made under conditions as nearly uniform as possible at the stations in each of the States. As a first step towards this unification of work it is apprehended that a closer relationship between the various stations and the National Agricultural Department will be found indispensable.

Following this unification of plan will naturally come the publication of a central report, embracing the work of the individual stations, and tabulating their results, while the discussions resulting from the attempts to settle upon a uniform plan of operations, and the comparison of the showings made by the various reports, when placed side by side, will be found a great educator for our experimenters, and a powerful stimulus to more accurate and effective work in every station.

The practical difficulty, however, with such a central report as hinted at will be to find a publisher. It is plainly the duty of each State to provide for the prompt and frequent publication of the results reached at its own station, and it would certainly be no further stretch of governmental function to provide for the collection and redistribution among the people of these State reports than it is to publish the bulky scientific and commercial reports which are constantly being issued from the Government Printing Office. But one point essential to the value of these experiment reports is prompt publication, and that is something very difficult to obtain, either from State or governmental printers. Could this objection be overcome, and a monthly or weekly gazette be issued from the Agricultural Department, similar to those issued from the Patent Office, the State Department, the Signal Office, &c., but devoted exclusively to this work, and distributed either free or by subscription, as is the Patent Office Gazette, or the Annales Agronomiques of France, some of the obstacles enumerated would be overcome. The publication would be accessible to every one; it would be comprehensive in its scope, and it would be free from the petty jealousies which any private publication would have to encounter.

But even this publication would be incomplete if its work were confined to the publication of the reports of the stations in their scientific form. For the greater portion of the readers whom it is desirable to reach through these reports, it is essential that they be stripped, as far as possible, of technical terms, and reduced to the utmost brevity consistent with clearness; and in the present state of scientific knowledge in our country it is essential that some of this work, at least, be done by the original reporters of the experiment. Some of our experimenters have realized this necessity, and we occasionally meet with an experiment report, given with the full details essential to scientific accuracy, but followed by a summary giving in simple language the essential points brought out. We regard it as of the greatest importance that our experiment reporters train themselves in this direction, believing that in so doing they will increase the force and value of their work, and will the more rapidly educate the people to a fuller comprehension of the entire scope and value of farm experimentation and of the science of agriculture.

We do not forget that this course is fraught with the danger that wrong conclusions may be arrived at by attempting to generalize from insufficient data, and that some of our experimenters who have most fully realized the ideal report we have attempted to indicate have avoided the scylla of indefiniteness only to fall upon the charybdis of hasty generalization, but this has generally been due to imperfections in the plan and method of the experiment, because of which the truth that the experiment should have revealed was perverted to untruth through lack of attention to necessary details.

In conclusion we would suggest and urge, if the idea of a central publication cannot be realized, either through governmental assistance or private enterprise, that each experiment director should select a list of agricultural journals having the widest circulation and forward to each as promptly as possible a hektograph or printed summary of the plan and results of each experiment made, given in the most condensed form compatible with clearness of statement, and indicating briefly the lessons to be drawn from the text. This plan is confidently recommended from personal experience, first as experimenter and later as editor, and while we are fully sensible of its defects, are quite sure that it is better than that of sending out only a voluminous annual report, and depending upon editors to rearrange and condense it for their readers.

In making up these lists of journals we would urge that they be not limited to the particular State or section in which the station is located. Our country is no confederation of States, but one glorious, united nation, in which no one State can prosper at the expense of another, and in which no State can attain its fullest measure of prosperity unless all others are prosperous. Therefore, aside from the local influences which depend upon differences of climate the citizens of Maine and of Texas, of Oregon and of Florida are equally interested in every advancement in agricultural knowledge made in either State.

The President. Is there anything further to be said upon the resolution or the report of the committee?

Mr. Dwinelle. Gentlemen, this last paper has brought out so many essential points, that I wish to give a little local experience in California on the same matter—reporting of experiments. It is a matter that I have thought over a good deal and in which I have had some experience worthy of notice; besides there have been failures in producing good results from some of the reasons just given, and some others perhaps to be emphasized. Now, our farmers do not read, perhaps, as much as they are expected to. Sometimes they cannot—most of them positively cannot sit down and read a bulky volume—and they are easily discouraged. You give a farmer in haying time a volume of perhaps two hundred pages; he looks it over and sees some of the headings, and looks out and sees, perhaps, that there is a big thunder-storm coming and he lays it aside, perhaps for the next winter. This sort of thing just intensifies a bad habit. Now, we have some reading farmers, but we will not have as many more as we ought to have so long as we use too large shot in firing at them. I became disgusted with those bulky reports some years ago, and I have been urging, continually, whenever I have had a chance, that our reports should be made in small parts. Let the large reports be made for the libraries and the legislature; but in all things intended for the farmers have frequent and short publications. Now, finally, we have got down to that sort of thing in California. For eighteen months or more the University of California, with the College of Agriculture, with its experimental department, has been publishing short and frequent bulletins giving the results of laboratory work and experiment on the ground, and particularly the results of experiments made at the request of farmers. The point was, how should we get these before the people generally? We knew from experience all about this jealousy among the newspapers. We had the Pacific Rural Press, one of the best agricultural newspapers in the world, I believe, and several others, but if we gave a copy to one and it got out a day before another paper, the rest would not publish it. We discussed the matter and tried to devise some plan of co-operation. Finally the Rural Press made arrangements with us by which they would lay aside any personal feeling if only they could get the matter as soon as anybody else. Now, when we have a bulletin ready, we send it to the Pacific Rural Press office, where it is set up, and, what is very essential, we get a proof-slip to read and correct, and then we have the use of that type, which is sent into the job printing-office next door, and as many copies of the bulletin as we wish are struck off on sheets. You, gentlemen, have seen some of them; they are gotten up just in an informal way, and we get as many hundreds or thousands as we like, at the simple cost of paper and presswork. The Rural Press people are liberal, and they do not charge us anything for setting up, and printing, and all that.

Then we have a list of all the newspapers in the State, and some outside, and we have the agricultural colleges and the libraries, &c., and of individuals who wish to get these publications, and who we know care enough for them to read them when they get them. We send first to those weeklies or dailies farthest away from us, in the distant parts of the State; those that are a little nearer we send to the next day, so that we know from experience that they will get this matter set up and ready for use just about the same time. In other words, it all comes out as fresh matter, and under that arrangement we have papers scattered all over the State that systematically and regularly publish our bulletins. Others cut them up, but we have a considerable number of papers that publish these bulletins in full. Now the result of this, I might say, is a perfect revolution as to the standing of the colleges of agriculture, and particularly of the experimental work, with the people of the State of California, so that, as I remarked to a gentleman last night, we are reminded of a certain chapter in a novel headed, "John finds himself too popular." We are overrun with work and requests of this character, and we do not know what we shall do unless we have some help from the United States, by appropriations, to help our experiment station. The College of Agriculture is flooded with applications for work that belongs to the experiment station, and not only do we get applications from California, but Arizona, Oregon, Nevada, and other places.

Get out your bulletins, get them published at once and simultaneously over a wide area, and the business is done.

The PRESIDENT. Is there anything further to be said upon the report of the committee?

Mr. GLENN. If you confine our discussion to the resolution brought forward by the committee we will get along more rapidly. While it would be interesting to bring in other matters, exceedingly important as they are, yet I would be glad to have this discussion settled—this matter of co-operation between agricultural colleges themselves or institutions for individual experimentation. I think that we should confine ourselves to the resolution of the committee.

A DELEGATE. I am very glad of some of the suggestions which have been made by the gentleman from Dakota, (Mr. Woodhull). I would like to ask him if he has considered the question of exchanges in some similar way with foreign stations and agricultural bodies?

Mr. WOODHULL. That would be a matter of detail for the bureau to organize and work out. I have no doubt that the system, once inaugurated, would be very readily developed. As it is now, there are exchanges between the various scientific societies of this country and foreign societies. Under an act of Congress, the Public Printer is required to furnish to the Smithsonian Institution a certain number of copies—50 or 60, I think—of every document issued from the public press, and these are sent to the respective Governments. Then, as I said in my paper, there are forty-two hundred foreign societies and eighteen hundred American societies that are now incidentally exchanging communications through this bureau. It is simply necessary to get into communication with some society, which could be done through the present International Bureau of Exchanges and——

(Here the hammer fell.)

The PRESIDENT. Under the rule a speaker can speak but once upon the same subject.

Mr. DABNEY. I believe we have now reached, after the matter of the legislation of the agricultural colleges has been disposed of so hopefully, the next most important subject which this convention will be called upon to consider, the subject recognized in that call for the convention so admirably formulated by the Commissioner of Agriculture, and made by the convention itself the matter for our consideration to-day. There are two important points bearing upon the progress of scientific agriculture of America presented to you in the resolutions brought forward by the committee. The first relates to the association, the union of all the institutions of the country, working for the promotion of scientific agriculture, in and through a bureau of the National Department of Agriculture. The second, based upon the first, relates to a medium of intercommunication between these various institutions. It appears to me, and I am very sure that every one present will assent to it, that these are fundamental matters. We have been in the past working all over the field of scientific agriculture in a comparatively undirected, disconnected way. It is true that we have accomplished a good deal, and we have great cause for congratulation upon the progress that scientific agriculture has made in this country in the last two years; cause to congratulate ourselves that many of the agricultural colleges have been put upon an improved basis, and that so many experiment stations and institutions for making special studies of agricultural chemistry, agricultural physics, and agricultural botany have been established. I believe that the next thing to be done is to unite and associate these institutions for the purpose of union of work and mutual benefit, and the most important means of accomplishing this must be the establishment of a medium of communication. How can we compare our work, how can we know each other, and what each intends to do, unless we have some medium? The resolution, fortunately, provides for this, too. I think that the country is ripe for it, and it is to this point especially that I wish to speak—the need of some general bulletin, to be issued by this Department, which will give all the results of agricultural-science work in this country and all of the best results of similar work done abroad.

Something over a year ago the speaker had the honor of bringing this matter to the attention of agricultural workers, and the result was a meeting of about twenty persons here in Washington. It came at an unseasonable time of the year, when the matter had not been thoroughly agitated and canvassed; but still these twenty men met together here with Commissioner Loring for the express purpose of establishing a journal of scientific agriculture. We were gratified and surprised to find that so many were convinced of the timeliness of a journal of this kind, and that so many were interested in the work. We found that there were some forty who were ready to engage as contributors to the journal, and we also found a great amount of work accumulated, much of it very excellent work, which was seeking publication through just such a medium as this. The list of gentlemen who agreed to contribute to the journal included most of the professors of agriculture and others present here, and among those who are not here to-day such men as Professor Brewer, Professor Johnson, Professor Atwater, Professor Jordan, Professor Hilgard, Professor Mallet, Professor Lazenby, and so on—the very best agricultural writers and thinkers in this country at this day. We were gratified to find next, that there was no difficulty about the financial basis of the journal, for through the efforts of Major Alvord, of Houghton Farm, a guarantee fund was secured and there was practically nothing left to be done except to secure an editor—and there we stopped. Because of this want we had to give the project up for the time. But this effort established some interesting facts: First, that the time was ripe for such a publication; secondly, an abundance of material was on hand; and thirdly, that public-spirited men were willing to give it that financial support which was necessary. I feel that we have now on hand a much better plan, not only for publishing this bulletin, but also for associating these institutions; through this Department of Agriculture, and I sincerely hope that the resolution will pass.

Mr. WILLITS. I am opposed to guerrilla warfare. I think the time has come when we can dispense with the guerrilla system of experiment. I find that we have been going on with our own work, without any special reference to anybody else, securing some good and some wasteful results. I believe that we have come to a time when we can meet together, under a common head, and I think this time is propitious for it. I think that the formulation of the resolution is a good one. The Department of Agriculture is the natural head, as it ought to be, of these experiments, and we can carry them on, in and through it, without in any way impairing our individual efforts; so let us pass on from that point and consider for a moment the matter from another point of view. I have some hesitation, as I said to the committee, about using the word bureau. That word, Mr. President, is to Congress what a red flag is to a bull. You are met immediately with the cant, "Oh, yes; you are starting in a new leak to the Treasury, are you? You are trying to build up the Department of Agriculture. You want to enlarge everything you get hold of," &c. Now, Mr. President, I would prefer, though I do not care about it particularly, that the bill which we have recommended, should be passed, and should have in it a simple provision for $5,000 or $10,000 to be given to the Commissioner of Agriculture for the purpose of a generalization of these results. Let him use for this purpose a clerk, or head, or anybody else he chooses. He need not call it a bureau. The Commissioner wants the work, and we want the work, no matter how we get it. The difficulty is, there are no bureaus, as I understand it, in the Department of Agriculture. The Agricultural Department is in truth and in fact, and in the general sense, only a bureau itself. It is called the Department of Agriculture, but it is not a department of the Government in the sense of the Navy Department, or the War Department, or any of the great Departments which surround us. It has no Cabinet minister. I had the pleasure of voting once or twice to make the head of this Department a Cabinet officer, and to make it an executive department of the Government. It is true that there is a head to the Department, so independent in his functions that he reports directly to the President, but in law it is nothing but a bureau, and it will so remain until Congress shall respond to the public sentiment that asks that this Department shall be made a department in truth and in fact. Then we can have bureaus. It is not, however, our intention to direct our voice and vote at the present moment to that issue. It is rather to get a bill through that shall give us the money for experiments, and then give money to the Department for the consolidation and generalization and publication of the result of the experiments throughout the country.

Mr. GLENN. I would like to ask another question. Is it meant by that resolution that the Commissioner shall have the bureau and arrange with the different experiment stations as to what particular class of experiments each one should make? I understood from a member of the committee that this resolution covered all that, and that arrangements should be made here for the co-operation of these different experiment stations. We ought to have some system among our experiment stations so that the work might be divided up as a scientific association in England divides its work. Does that resolution contemplate leaving it to the bureau to make these arrangements?

Mr. ATHERTON. At the suggestion of the chairman of the committee I would state that that point was under consideration before the committee. It was definitely decided not to include it in the resolution for this reason: While the committee recognize that it was the second necessary step, they felt the first thing was to indorse the idea of a bureau, and co-operation with it, on the part of the colleges, and it was thought best not to encumber the resolution with any provision.

Mr. GLENN. I recognize the importance of that. It is a most important matter that we are arranging for. I do not care to make a speech, but I would like to press the first matter and have something said about the other.

Mr. RILEY. I presume there is no question as to the advisability of passing these resolutions; but the question in my mind is, and perhaps it has occurred to others, whether anything feasible and practicable will grow out of the passage of these resolutions. In other words, have we considered the power that the Commissioner now has in the Department; have we considered the way in which the different divisions of the Department are organized and are now working? The question will arise, first of all, whether this is intended to be merely a new division to take charge purely and simply of the correspondence—that is to say, a bureau of correspondence, as it has been described to us by one of the speakers—or is it to be a bureau that shall take charge of all the co-ordinate work between the Department and the different State agricultural colleges. If it is to cover the broader ground of co-ordination, or of directing experiments, then the question arises how far do the present funds, already appropriated, allow the Commissioner to fulfill such a function. Of course the heads of the different divisions of the Department, as now organized, will be interested in any experimental work at the colleges or stations which in character approaches that in their divisions, that is to say, the chemist, the statistician, the entomologist, the botanist, the veterinarian, &c., will all have an interest in experimental work done at the different State centers. If merely a new bureau of correspondence is intended, I think that a great deal might be gained by increasing the scope of the resolutions. Nothing tangible is likely to result unless there is an additional clause asking Congress for an increase of funds, as was suggested by the Commissioner, in order that he may have a sufficient sum for the efficient organization of this new division. There should exist right here in the Department of Agriculture some systematic plan of co-ordinating and correllating the work of all these different experiment stations. I am sure that we shall all be glad to adopt any provision which shall make the resolution effective in bringing about such co-ordination.

A DELEGATE. I should like to have the resolution read.

The PRESIDENT. The chairman of the committee will again read it.

Mr. Alvord again reported the resolution with the following amendment:

*Resolved*, That Congress be petitioned to provide the necessary fund to carry this scheme into effect, in connection with the annual appropriation for the Department of Agriculture. And that this shall be referred to the committee on legislation for active co-operation with the Commissioner.

Mr. WILLITS. Leaving out the word bureau.

Mr. ALVORD. It seems hardly necessary to reply further, than with the rereading of these resolutions with the amendments, to the points that have been raised by the gentlemen who have already addressed the convention. The committee have discussed this matter from the time of their first meeting, and at several sessions, and the result of their deliberations has been embodied in these resolutions. I think I may state on behalf of the committee that it regards this as a beginning—a sort of formulation of the idea conceived by the Commissioner and embodied in the call for this convention—and that it views it only as a beginning. It is our duty, assembled as we are under this call to at least aid and abet the intention of the Commissioner by presenting some general plan, which, although it may be small and immature, yet has in it the germ of the idea. Such is this plan, which we trust will grow and develop into what we desire, in the course of time, with such help as we can give to it, and give for it, in every proper manner. And let me add that it is not entirely a new plan or project. In a few words historical let me call attention to the first convention of this character ever called by a Commissioner of Agriculture. That was in 1872, and was composed chiefly of delegates appointed by the representatives of agricultural colleges. There was manifested early in the session, and it crept out throughout the deliberations of the convention, the feeling of need on the part of college officers of a medium of intercommunication, a desire for some central office through which they could, without effort on their part, periodically, regularly, systematically hear from one another, without the necessity of individual effort or correspondence or any formal action taken on the part of these scattered institutions, and in accordance therewith, taking the form then of a petition (it was stated to those present that no change in the organic law was necessary) this wish was expressed to the Commissioner of Agriculture asking him to establish such an office of correspondence. I remember the paper very well. It so happened that I acted as secretary of the committee which framed the petition and I now have in my possession the original petition, and it has passed under my eye within a few months. I recall now that among the signers were White, Welch, Clark, Gregory, Abbott, and a long list of prominent officers connected with the agricultural colleges. So much for the history of this effort thirteen years ago. At the next convention called by the Commissioner of Agriculture, and held on these grounds in January, 1882, the same subject soon arose, and through a preamble and resolution presented by Professor McBryde, of the University of Tennessee, and now of South Carolina, a committee of five was appointed to which the subject was referred. A long discussion followed, which was one of the prominent topics of the business of that convention, and as a result that committee, as shown on page 61 of the record of the proceedings, presented a long report, which was signed by President McBryde, Professor Caldwell, of Cornell, Professor Atwater, of Connecticut, ex-Senator Sargent, and myself.

The committee proposed, among other things:

1. That the Department of Agriculture might furnish to all engaged in agricultural experimentation in America a well prepared digest of the work of this character accomplished at the best stations of foreign countries, either as a part of the annual report, or, preferably, in a separate and earlier publication.
2. That the Department of Agriculture might take measures to become the medium of communication between all parties engaged in systematic agricultural experimentation in this country, and endeavor to secure general co operation in this work, especially the prosecution of certain important investigations in a number of different localities after a carefully prepared plan. * * *
3. That the Department of Agriculture, acting for this convention, be requested to bring this important subject to the attention of Congress, and apply to that honorable body for the necessary means to carry out these suggestions, including such aid as it may seem best for this Department to extend to those now unable, for want of funds, to engage in this work.

I merely refer to these matters to show that this is no new subject. Now, why is it that nothing has come of these efforts? It is a somewhat personal matter. Unfortunately at that first convention the meeting came in conflict with the wishes and plans of the then Commissioner, and a falling out could not be avoided. At the outset of the meeting the Commissioner undertook to run it in a definite and fixed channel, which he had already prepared. Those present at the convention were too big for the rut; they took the bit in their teeth and organized their own convention, and I regret that the Commissioner felt called upon to take up his hat and walk out of the door of the first convention which he had called. So far were we from having the Department's sympathy that we actually had to provide our own means for publishing the proceedings, and, of course, one could not expect that the recommendations of that convention, or its petitions, would receive much attention.

Then, when the next convention met here in 1883, we were called upon to consider a resolution which was intended to plan, besides this division, uniform experiments at the different colleges and stations, and the idea was (the date of the meeting being in January) that before seed time there would be ample opportunity for consultation and arrangement among the States and through the agency of the Department, thus agreeing upon some plan that might be presented; but instead of that, just at the outset of the season, and, indeed, after work had begun in a part of the country, a pamphlet was issued from this Department laying down a complete plan of experiment, asking everybody who experimented at all to do this and that according to this ironclad plan. That was the work of a skilled mind, but, very naturally, gentlemen had other plans by that time and politely declined to attempt to work in the strait-jacket. Now there is nothing in either experience to discourage us at the present time. They were simply unfortunate circumstances. We are now working, gentlemen, upon new ground; under new and much more favorable auspices. I think that the convention will agree with me that the idea of co-operation, as suggested by the Commissioner under the call which has brought us together, and the relations maintained throughout our session warrant us in believing that this particular resolution, no matter how weak it may be in its phraseology, will suggest to the Commissioner the inauguration of a plan which, for the present, sufficiently covers the whole matter. Thus we leave it to him, and have faith that out of the fertility of his resources and effort, if not now, yet, in time to come and with such help as may be procured, the necessary details will be supplied to bring the plan to a mature and useful form. With that hope and belief I now move the previous question to obtain a vote upon the resolutions as amended by the committee. [Applause.]

The resolutions as amended were then adopted.

The president gave a notice to the delegates relative to their reception by the President of the United States.

Mr. ALVORD. The committee on business is very much intent upon pushing the business of this session, believing that in all probability it is the last business session that we shall have, and we ask that the business of this afternoon be resumed as soon after 4 o'clock as possible. The committee now asks especial attention to the following resolution:

*Resolved*, That with the evening session of this day (Thursday) the business of this convention be closed; that further sessions be for essays and debates only, no action to be taken in the name of this convention.

The resolution was agreed to.

Mr. ALVORD. The committee now urge upon all members attendance at the afternoon and evening sessions, that the business of the convention may be properly conducted. They ask now that the subject of industrial education be resumed to be opened by a paper from Colonel McWhirter, the commissioner of agriculture from Tennessee.

Mr. MCWHIRTER. Mr. President and gentlemen of the convention: I will say in regard to this paper that I have prepared it hastily, as I thought I would not be able to attend this convention until last Friday. My paper relates to agricultural as well as to industrial education:

It is a remarkable fact that the first of all sciences should in the progress of the ages have been the last systematized under developmental law. Nor at the present day, with all the facilities for progress, with all the cognate sciences pointing in the direction of its development, is the *organon* of agriculture at all fixed or positive. The General Government and the governments of the several States of our Union have come late to consider how vital to the interests of any country is the enlistment of legislative authority in the liberal patronage of agriculture and industry. It is strange, passing strange, that for so long a time intelligent agriculture and scientific industry were left out of the councils of our land. Political pyrotechnics and diplomatic dialectics absorbed the time of our assemblies, and left no room for the great practical issues of agriculture and industry. Educated men avoided these fields of labor and rushed to the forum, the pulpit, the laboratory, and the delightful Arcadian shades of literature, rather than assume the cares of agricultural and industrial life which the educational and political systems of our land had so utterly ignored and relegated to the rude, the uncultivated, and the ignorant.

It is my purpose in this paper briefly to set forth (1) the necessities of Government aid in developing agriculture and industry ; (2) the propriety of incorporating agricultural and industrial departments in our great educational system, and (3) the importance of correlating our agricultural industrial colleges with the interests of the individuals who are engaged throughout the length and breadth of the land in these pursuits of life.

1. The necessities of governmental aid in developing agriculture and industry. There is no power in development stronger than centralization. There is no centralizing influence more powerful than government when properly administered and applied. The time has passed when every man became a law unto himself. This was barbarism, and the first dawn of civilizing influence was seen in the organizing of individuals into communities for individual comfort and the general good. In the progress of civilization it was found necessary to enlarge the scope of government from a mere system of defense into an agency of development, to divide the economical needs of the community into departments whose heads should form part of the organic unity of government, and by whose representative power such needs should be met with properly devised means of supply, and thus reach the highest end of political compact. How grandly this has been carried out in the civilization which succeeded the disintegrating system of feudalism, history most brilliantly sets forth. But it was reserved for the political economists of the nineteenth century, and that, too, of its latter half, and I feel proud to affirm in our own great Union, to properly appreciate the immense needs of a fuller representation of agricultural and industrial interests in the departments of government. It pains me to assert *en passant* that their efforts have too often been met with cold indifference, with sarcastic criticism, and even bitter opposition, at the hands of those in whose interests their labors were expressed. Such opposition is the offspring of ignorance, and calls for the very measures which it is my purpose to show belong to the executive authority of the land to establish.

While it is a recognized fact that individual enterprise is a great factor in the history of the world's development, it must be admitted that general progress founded upon this alone would necessarily be irregular and spasmodic. The world is fast coming to the conclusion that that government is best administered which looks more to the development of its resources than to the establishment of its martial glory or its diplomatic renown. The amount spent for naval repairs would, if applied to the development of agriculture and industry, have made our deserts blossom as the rose and have filled our waste places with the hum of industry and the joyous song of the contented laborer. To our glory be it said, however, that without costly armaments, without martial display, the United States of America could command at a moment's notice a grander army from her yeomanry than all the powers of Europe could gather from her uniformed puppets and her armed automatons. This fact the Government should ever keep in mind, for in every appropriation for agricultural and industrial pursuits it is sustaining an army of laborers, not of idlers, who in peace are developing the internal resources of the land, and in war will spring at the throat of any foe who threatens the homes they love so well and for which they have lived and labored. Every encouragement to effort, every facility for improvement should be given by the General Government to all departments of agriculture and industry, for there is nothing that so endears an administration to the hearts of the people as a pronounced interest in the resources of every section. Superior to all party prejudice is the prosperity of every interest to which the labors of the people are committed. It is then meet, right, and the bounden duty of the Government to enlarge to the fullest extent of its capacity the means of developing its agricultural and industrial resources, and no astute diplomacy or splendid oratory can atone for its neglect.

2. The propriety of incorporating agricultural departments in our great educational system. It is only of late years that we have felt the necessity of teaching men to be farmers and artisans and mechanics. The college was held formerly as the exclusive right of the *spirituelle bibliophagi*, whose face "all sicklied o'er with the pale cast of thought," could only turn to "musty tomes on crowded shelves." But thanks to the vivifying influence of American practicality the pale student of the classics and the mathematics have been placed side by side with the ruddy sunbrowned son of toil and have felt the healthful thrill of his genial nature. The educational system of no State is complete until her agricultural and industrial interets are represented thoroughly and effectively in her university. The State agricultural and industrial college should be the great center of crystalization for all the information that is from time to time developed in the sciences pertaining to these grand departments of political economy. It should also be the center from which should radiate all information thus acquired into the remotest corners of the State which sustains it. In this way the theoretical and the practical will be brought together in harmony, discoveries would be recorded and enlarged upon, and the investigator and the laborer brought *en rapport* with each other and made to feel a reactionary influence which must of necessity be healthful to general development.

No amount of pure scientific learning can make a successful farmer; no amount of practical experience on the other hand can supply the place of scientific culture in departments which are so thoroughly dependent upon scientific investigation. It is the harmonious union of these alone by which we can reach perfection of development. What is to be the link which binds them? This brings us to the third division of the subject before us.

3. The importance of correlating our agricultural and industrial colleges with the interests of the individuals who are engaged throughout the length and breadth of the land in these pursuits of life. How is this to be accomplished? I answer, by our State agricultural boards and bureaus. These fill up this great want in our political economy. They are the great reservoirs of agricultural and industrial information for the people. They are tangible. They come in direct contact with the people, and by correlating, classifying, and arranging these gathered materials they furnish to the college an ever-increasing museum upon which scientific methods may directly be brought to bear. It is wonderful how thoroughly filled with a desire for emulation a people will become when the result of their labors is displayed before them, carefully considered, and utilized in the direction of wider improvement. They will listen to science through a practical medium like this, and the wave of feeling that oscillates between scientific investigation and practical experience is kept in constant activity. The agricultural archives of a State from year to year give you the panorama of its progress. We cannot do without them. A State that attempts it paralyzes its industry and writes Ichabod upon the altar of its economic wealth.

I have thus defined as briefly as possible what I conceive to be the *organon* of our agricultural and industrial interests in their relations to government, and I call upon our great leaders to lend their highest energies and talents to this vital element of national power.

The PRESIDENT *pro tempore* (Mr. Willits). The subject of industrial education has the platform now. You are a committee of the whole with no formal resolution before you; the subject-matter is open for discussion. Have you anything further to say? Does any gentleman desire to be heard?

Mr. MAURICE. Mr. President, I have prepared a paper that is an exact complement of the one just read by the gentleman. It is practical; I give the practical way of uniting the theory and practice of agriculture in our agricultural colleges; it will take only twelve minutes.

The PRESIDENT *pro tempore.* What is the pleasure of the convention? Shall it be read?

Several delegates responded in the affirmative.

The PRESIDENT *pro tempore* (recognizing Professor Maurice). Professor Maurice, of the Maryland Agricultural College.

Mr. SMITH. May I—did I understand the gentleman aright? What does he represent?

Professor MAURICE. Nobody but myself.

The PRESIDENT *pro tempore.* I should have said "late of the Agricultural College of Maryland."

Mr. Maurice then presented the following paper:

## WHAT AN AGRICULTURAL COLLEGE OUGHT TO BE.

Mr. President and gentlemen, though this paper is intended more especially for the Maryland Agricultural College, it may be of use in the reorganization and successful management of other institutions in the same situation, whilst myself and our college may derive a great benefit from the free criticism here of these views by the most competent and successful managers of agricultural colleges here gathered at your solicitation——

Mr. SMITH, of Maryland (interposing). Will you allow me to interrupt? Will you tell this convention what is the idea, the intention, of your paper, and what is to be the drift of your remarks? I do not understand it.

Mr. MAURICE. I want to state how you can unite in an agricultural college both practice and theory. I want the college to be a collegiate institution in the broadest sense of the word, and then to be also an agricultural institution of the highest standard, and how to do that and how to be a regular college and also an agricultural institution is what I want to show. Your boy learns at Annapolis to be a midshipman, and also gets as competent an education as in the best college in the land now——

Mr. SMITH. With all respect, will you allow me to say to you that I did not mean at all to draw out any such extended explanation. If your remarks are merely on the abstract question, if there is nothing personal in it——

Mr. MAURICE. Oh, no! no! There is nothing personal——

Mr. SMITH. I do think, sir, that this convention should have been very particular as to how it constructed itself; that is, I mean as to who should be permitted to be a member of it and what subjects should be discussed. Now, I thought that we had sufficiently defined our position when all of that was left to the committee on rules and resolutions. Now, I have no sort of objection to Professor Maurice; I have no objection whatever to his making that a general topic and in that abstract form, without personality——

Mr. MAURICE. Sir, it has nothing in it personal to anybody.

Mr. SMITH. I thought at first, sir, when you stated he represented the agricultural college of which I am president——

The PRESIDENT *pro tempore*. It was my mistake. I saw a moment afterward that the word "late" was included.

Mr. SMITH. The committee on credentials has not presented the name of Professor Maurice as a member of this convention.

Mr. MAURICE. I have been presented to this convention by the statistician of Maryland, W. W. W. Bowie, my father in-law, a man whom you all know. He wrote to the Commissioner of Agriculture, and I represent myself alone, or, if you prefer, I represent Colonel Bowie, my honored father-in-law, who could not come.

Mr. SMITH. I desire to be thoroughly understood. I have no objection at all, if it is the pleasure of this convention to hear Professor Maurice, if he proposes to read a courteous article, and if he proposes to——

Mr. MAURICE. I have been more courteous than the gentleman has, so far.

Mr. SMITH. If he proposes to treat this subject in an abstract way I have no sort of objection.

The PRESIDENT *pro tempore* [to Professor Maurice]. Proceed, sir; you have five minutes left.

Mr. MAURICE. But, sir, I have been interrupted and delayed.

Professor SANBORN. This convention has the right, sir, to give the gentleman the floor; it did so, and I am very sorry to have him interrupted——

Mr. SMITH. I only want——

Mr. SANBORN. I insist upon the floor, sir. I am very sorry that the gentleman should be interrupted in this way, and I hope he will be allowed now to proceed.

Mr. MAURICE (resuming):

The solution of the problem is more simple in the State of Maryland than in any other in the Union, for the reason that we have in our midst, within a few miles of the college, a model institution which has no superior in the world—the United States Naval Academy. Let us see how a standard agricultural college could be modeled exactly after the pattern of that peerless institution—the United States naval school. The process will be of mathematical precision: from the known quantity—the naval academy—we will disengage the unknown—the agricultural college.

The two institutions have striking points of resemblance. One is entirely supported by the United States; the other is supported jointly by the General Government, through the gift of a landscrip, and by the State of Maryland through annual appropriations. The United States require that military tactics should be taught in both institutions. They have the same object in view—not to teach at public expense a few privileged American boys a trade or profession by which they may make a living—but to enable them after graduating, as so many Cincinnatuses, to serve our common country in times of peace and in times of war by the *sword* and by the *plow*. "*Ense et aratro*" should be the motto of our agricultural colleges, as it was that of an illustrious French warrior, Maréchal Bugeaud, who won as many laurels on his farm in France as on the battle-fields of Algiers.

In this connection let me dispose at once of an erroneous notion that agricultural colleges are founded for the exclusive benefit of farmers who want their sons to be educated to become farmers. It is a mistaken notion. Out of ten farmers who send their sons there you will find hardly one who wishes to make his son a farmer. For, indeed, if he had such a notion he would not send him to college. Our successful farmer is somewhat a little conceited—it is his pet sin—and he entertains the firm belief that he knows more "about farming" than a whole faculty put together. And he is not altogether wrong in that respect, judging from the failures of so many agricultural colleges. When he wants his son to be a tiller of the soil he keeps him at home.

Conversely, if you question ten boys who go to the "Agricultural," nine will answer that it is to get rid of farm-life; that they want to become lawyers, doctors, engineers, &c. No harm in that boyish idea. Let them all come to our regenerated college; "no questions asked" as to their future aspirations. Let them graduate with honor and then enter the so-called learned professions.

## THEY WILL SUCCEED OR FAIL.

If they fail in the midst of an ardent and overcrowded competition, they will return disenchanted to their farms and will gladly remember the thorough agricultural education received at the Alma Mater; and if they have not entirely forgotten their Latin, they will exclaim with the poet of the Georgicon: "Et hæc olim meminisse juvabit." The starving physician or lawyer will soon become a well-to do farmer.

If, on the other hand, they achieve a brilliant success as doctors, lawyers, journalists, merchants, &c., they will make money rapidly, and, as sure as fate, the first investment they will make of their accumulated wealth will be to buy a farm or country residence on which they will lavishly spend in costly experiments, improved methods, and thoroughbred cattle, part of their hard-earned gains in the liberal professions.

And who will reap the benefit of this costly outlay? The farmers of the neighborhood, who will look meditatively over the fences of their rich neighbor. Thus the real educators of the community in agriculture are those very retired doctors, lawyers, and merchants—co-operators and co-educators with the faculties of our agricultural colleges.

## THE CURRICULUM OF STUDIES AT THE NAVAL ACADEMY.

It comprises every branch taught in our best colleges within a course of four years:

1. All the high branches of English, literary and scientific; moral and mental philosophy; international law; two foreign languages—French and Spanish; the sciences are brought to a standard higher than in any college I know of; mathematics, calculus, astronomy, chemistry, natural philosophy, &c.

2. Military tactics are thoroughly taught.

3. Seamanship and navigation theoretically and practically. Every midshipman has to perform the work of an ordinary seaman; he knows every part of the ship, every rope and their uses; he climbs the masts, furls and unfurls the sails, &c. In fine, to graduate, he must be as proficient in all the details of purely muscular work as any sailor he will have to command when an officer.

4. There is a workshop and a steam engine where the cadets have to work timber and iron with their own hands, and to learn how to repair or replace, if needed, any part of a ship. It is their school of mechanical arts. There is even a studio where they learn photography.

5. During the four summer months of the annual practice cruise, from June to October, the middies have the management of the ships under the eyes of the officers on board, the more advanced cadets acting as officers, the others as seamen and sailors.

This is not all they have to master in four years, but it is enough for my thesis.

## THE CURRICULUM OF STUDIES AT THE AGRICULTURAL COLLEGE.

These should be as comprehensive as the above. In other words, it ought to be a in the fullest and broadest sense of the word, a college of the highest order; and, at college the same time, it should give a thorough education in all the branches connected with agriculture and the mechanical arts.

1. The collegiate course should embrace all the branches enumerated in the first paragraph above; the only alteration suggested would be to substitute Greek or Latin for Spanish; the modern language should be French or German *ad libitum*, or both.

2. Military tactics should be taught as required.

3. Instead of seamanship and navigation write down agriculture and kindred sciences, and give to agriculture and horticulture the same importance, the same number of hours of intellectual and manual work as is devoted to seamanship and navigation in our model school.

4. In the same way have also a workshop, and substitute the words farm and agricultural implements for the words ship and steam engine and you will have the exact measure of mechanical arts that should be grasped.

5. Vacation and practice cruise. "Ah, here we have you," will exclaim my would-be critics, "surely you don't mean to send your students on an agricultural practice cruise." Indeed, I do; nay, I consider this feature the best of the whole plan.

Has it not struck you that in our agricultural colleges the best part of the year is lost; that all that the students have done and learned during the winter months is naught, for they leave the college and the college farm just at the time when they could see and judge the results of the manual labors, of their experiments on the acre or quarter of an acre allotted to each to try their hands at farming. Like the Apostle of the Gentiles "they have sown and planted, and another reaps and gathers." It is all wrong. They lose the benefit of their practical studies and the encouragement to improve their methods in case of failure.

I have no doubt that a few students—especially those who, being orphans, have no particular home—could be induced to remain during vacation on the college farm for the harvest, and they would keep a faithful record of everything of interest to their absent comrades. Those going home should be required to spend the greater part of their vacation either on the paternal farm, or on some model farm in the vicinity. They would be required to effectually take a practical part in the work of harvesting and to bring at the reopening a record of their observations—a kind of agricultural essay. All the students would then compare notes under the critical eye of their professor of agriculture. Any student in the high classes failing to comply with this requisite would be debarred from graduating in agriculture. But this regulation would be most readily, most cheerfully submitted to by our apprentice or cadet-farmers. They would rather like it. Some would club together and crave admittance on some noted farm in the State.

Such would be my agricultural practice-cruise, or what is called "encampment" at the Military Academy.

Now that I have sketched my Maryland Agricultural College, I come to possible objections. The first and may be the only one I will have to contend with, is the multiplicity of studies crowded within four years.

But all educators of experience know that the more you multiply studies and tasks, the better the average collegian grasps and masters all of them. Give them few studies, exact little work, and they will not do it well, if they do it at all. Even the small boy and girl who complains every day at home of the "awful work" he or she has to do, would be seriously offended if you take a single text-book from the load they carry so proudly from home to school and back daily.

When the collegian has a lot of studies to attend to he soon understands that it is no child-play. In an experience of over twenty years of professional life I can assure every father or mother that I never saw a boy or girl die from overwork at school, and that many have gone to a premature grave from just the reverse—bad habits contracted in idleness.

My answer to the objection that this plan is a fine but impracticable utopia, is that such utopia has been in existence and fully exemplified at the Naval School for nearly half a century, and has given a staff of naval officers that have few equals and no superiors in the world. Why not expect the same result with our futuie staff of agricultural officers?

Indeed, so well convinced am I of the correctness of these views that while inviting and courting criticism I am not yet prepared to recede one step from the position taken, and would not take an iota from the programme laid down. I speak professionally and knowingly, for I have been connected with both institutions—the Naval School and the Agricultural College.

Is the average midshipman, coming from all parts of our country, superior in mind and body to the average collegian of Maryland? Is agriculture more complicated than seamanship and navigation? Is it more difficult to manage a farm than a man-of-war? Is it easier to plow the deep than the terra firma? Is it harder to understand a mower or a reaper than a sloop or frigate? To repair or build a barn than a steamship?

The question is answered as soon as announced. For my part I say, most emphatically, "No."

During the reading of the above the following took place:

The PRESIDENT (to Professor Maurice). Your time is up, sir.

Mr. SMITH, of Maryland. If it is in order, I move that he be permitted to proceed.

The motion was agreed to; and Mr. Maurice resumed and concluded the reading of his paper.

Mr. FERNALD. I would like to inquire if this question is to be continued with the afternoon session.

The PRESIDENT *pro tempore* (Mr. Willits). I think likely that it is the intention of the committee on order of business to so continue it, unless there are other matters to present.

Mr. FERNALD. I will occupy but a moment now. I think, sir, that questions that look to legislation are important ones and that they should receive the indorsement of the convention. I have been hoping, however, that this convention would afford an opportunity for a comparison of notes by those who are actively engaged in the work of administering our agricultural colleges, in order that, if possible, we may gain such information as shall aid us in rendering our future work more effective. I remember very well that in previous conventions, which it has been my privilege to attend in Washington, that complaint has been made, and was made, to the effect that in the different States there was a large opposition to the colleges—to the colleges of agriculture and the mechanic arts—especially on the part of the farmers. I hear very much less of such complaint at this convention, and very many of the members of this convention have assured me that the condition of the sentiment in their respective States is very different from what it was a few years ago. I want to know, gentlemen, the means by which this change of sentiment has been brought about. I think it would be of interest, especially to those from States in which there may be at the present time adverse sentiment—I think it may be of interest to know the methods by which this change of sentiment can be effected and thus bring the college into closer sympathy with the agricultural classes. And there are other questions besides that come home to those in charge of agricultural institutions which I think may well be discussed under this general subject of industrial education, and which may be brought out in such a way as shall assist us in the future.

It was not my pleasure to be present last evening, and it has not been my pleasure to listen to all the papers that have been presented, and hence I come to any discussion at a little disadvantage; but there are a few lines of thought upon which I hoped some time might be given by the convention in its future deliberations. One has already been indicated, that of the method of shaping sentiment in the States so that the members of the legislature will come to the aid of the colleges. How can that be done? I am very glad to be able to say that in our own State, in the State which I represent (Maine), there has been a very marked change of sentiment within a few years favorable to the college. It has been brought about, I think, in some measure through the active sympathy of some of the agricultural organizations of the State. When the college was instituted, the board of agriculture in the State of Maine was opposed to the institution. In a very little time a change of sentiment was brought about, or came about, in that body. I have been connected with the board of agriculture for the past twelve years (possibly a little longer, but fully twelve years), and nearly all that time the board of agriculture held a friendly attitude toward the college and has been ready to assist it in every possible way. There are other bodies in the State—the grange organization and agricultural societies—that have taken no very active position relative to the college until within a few years. These organizations have manifested an active interest—especially the grange—within the past three or four years, and the result is that an entire change of sentiment in the State is going forward, and at the two last sessions of the legislature the appropriations which we desired were obtained with very little effort and very little debate; whereas previously (the contest has been in the house of representatives) the last two appropriations were voted without a dissenting voice in the house, and no discussion except a brief one arising in the senate, and at the last session of the legislature so far advanced had this favorable sentiment come to be, that an experiment station was established. I simply indicate the favorable sentiment that seems to be progressing in our own State.

I think one of the agencies by which this result had been procured has been a recognition of the fact that the college has been endeavoring to put itself fully in sympathy with agricultural work in the State, and endeavoring to teach men how to become practical farmers. Of course, only a small proportion, a small percentage of the students, took the course of agriculture. While five ways are open to the students they will follow those divers ways, yet I have been constantly graduating students in agriculture and been endeavoring to do in the line of agriculture somewhat as has been suggested by Professor Maurice, following out the plan of making the agricultural work just as common as we make work in the line of civil or mechanical engineering—work on the farm as prominent as work in the shop. I do not think we are in a condition to do it as fully as we ought. I look forward to the time when we can do it as fully and practically as we wish, when the college farm shall be a factor in the college work—shall be an appliance, an instrumental appliance of the institution, as much so as an air-pump, a transit, or a workshop, and I think the nearer we can come to that basis the nearer we will bring ourselves into sympathy with the farmers of our respective States and secure their sympathy and aid in behalf of the institution with which we are engaged. Now, I might, Mr. Chairman, follow out other lines of thought that have been suggested to me since I came here, and still other lines which have been presented while the discussion has gone on; but I will not trespass. I would be very glad, indeed, to hear any suggestions that may be of service in making the work of the agricultural colleges effective, that we may accomplish the end in view—that is, to make our colleges thoroughly efficient. I leave out the other features of the institution recognized by law, and, which we are obliged to recognize as much as agriculture—that of the mechanic arts. I think that is a department of the work of an institution that will the more easily take care of itself. I have found it easier to develop the mechanical and civil engineering department than the department of agriculture, and our progressive work is to be more in that line. I shall be glad of suggestions that will enable me as president of one of these institutions to work out that problem more efficiently for the State of Maine.

A DELEGATE. To what extent are the languages taught in your college?

Mr. FERNALD. The French and——

The DELEGATE. No dead languages?

Mr. FAIRCHILD. The suggestion of President Fernald calls me out as having had the pleasure of being connected with two agricultural colleges which have stood, above all I believe, well with the farmers of Michigan and Kansas, and I want to point out just one measure by which it seems to me accord has been brought about. In the winter of 1875–'76, there was inaugurated in Michigan, under lead of Prof. R. C. Kedzie, a system of farmers' institutes in which the college undertook, by order of its board of trustees, to arrange for six institutes in each winter, to be held in the different counties of the State. At each institute the college undertook to provide one-half only of the programme; and insisted, with emphasis, that the other half of the programme should be provided by the locality in which the institute was held. The expense of attendance was borne by the college, while the expense of the local arrangements had to be borne by the local committees. Every question brought forward there was open to discussion, and very close attention was given to it, and the discussion of these questions was always encouraged. From that day to this, I think that institute has grown in favor, both with the farmers and the professors of the agricultural college. The same thing has been in vogue with us in Kansas since I went there in 1879. We opened a series of institutes in the winter of 1880-'81 and have continued them from that day to this, with growing interest and with especial favor as regards the farmer. We promote discussion upon just such questions as the farmers wish discussed, and the professors take especial pains to prepare themselves to meet the questions which may be raised by the farmers themselves. Of course particular pains is taken to adjust the teachings of science to the wants of the practical farmer, and although that may bring a great deal of scientific knowledge into the debate, their efforts are to make it seem directly useful to those to whom it is addressed—science not for its own sake either, but science because science is useful. The expression is now common among the farmers that these professors of the agricultural college do not walk with kid gloves, while the expression has often been made before by the people, that they would have nothing to do with the professors. I think this is one of the means by which we adjust our curriculum, our means of teaching, our habits of thought, to the wants of the community. My idea is that we must be within the reach of every farmer's son, so that every man can graduate out of his district school into the agricultural college. Now, we find the best help towards such a result is in this method of meeting with the farmers, upon their own plane, discussing as they discuss this question, or that, encouraging their discussion, taking pains to keep fully informed, having the local papers make mention of the discussions and publish the names of those taking part in them, and, as in Michigan, providing for a full annual report of these debates; for the fact is they are all human and they all like to say something that is interesting, and to read it as they said it afterwards. It makes them feel proud of having been connected with such a debate. In Kansas we have no such report, but we do take pains to see that the local papers report our proceedings as fully as possible. I will not take up your time with any further remarks.

Mr. CHAMBERLIN. I wish to say a word in this connection. Some gentlemen this morning spoke of the reports of the boards as being so dry and uninteresting. Now, President Fairchild has told you of our efforts in holding these institutes, the publishing of the report of the State board, and the discussion of these papers. The time was when they were piled up so that you could hardly get into our library for these reports, but now the State gives us an appropriation of $8,000 to publish them; they are made interesting, and we do not have to throw them at the heads of politicians. They are in demand, and they are read. That is one of the efforts. We have had difficulties in Michigan; President Fairchild knows more about the old difficulties than I do; but we have had difficulties in my own experience. I am glad to say that there has been an advance. It would be hard to overstate the importance of these farmers' institutes. There is, in fact, a demand for more of them than we can organize. We say to them, "We cannot get into your portion of the State this season." "Well," they say, "if you cannot, all right; we will get up an institute of our own," and so they do, independent entirely of our organization. Now, some one has suggested another difficulty, which came through the want of sympathy between the college and the several agricultural organizations of the State. I want to suggest the adoption of the custom of inviting the executive committee of such an organization to go and visit the agricultural college, to criticise and make suggestions. We do this with the executive committee of our society, with the State Grange, with the State Pomological Society, and I want to say to you, gentlemen, that at our meeting, which occurred the first of last month, we had with us the cattle men who were on our executive committee of the agricultural society. They looked over our herds of cattle there and said they were all right. Through this custom they have ceased substantially to criticise, and we are now in full accord. I am talking a little away from the question, but I presume every State has its own difficulties. One difficulty is, we have a university, in charge of the State, asking for appropriations the same as we are, and they are seeking, and undertaking, to cover the ground which we claim belongs to us. Other localities may not have that trouble, but may be under the necessity of teaching the arts and sciences; but the difficulty with us is that the university wants to teach everything and we want to control a part of it ourselves. That is one of our difficulties. We have had a controversy in regard to teaching the mechanic arts, which was settled in our favor. We called on the legislature to give us an appropriation to erect the necessary buildings, and I want to tell you how they did it. We went to work and read the law which was passed by Congress making this donation of land to the State, and we then read the law of Michigan accepting the trust-fund, and then we insisted that every trust must be met and carried out in good faith. I might go on elaborating the several difficulties which we have had, and do have, to contend with, but I will not occupy your time.

The PRESIDENT *pro tempore*. The time has now arrived at which it was voted that we should adjourn, to resume our meeting after the reception by the President.

Mr. ALVORD. With the understanding that this discussion be continued.

The PRESIDENT *pro tempore*. Yes; with the understanding that this discussion be continued.

And then, at 2 o'clock and five minutes, the convention adjourned until 4 o'clock.

## AFTERNOON SESSION.

The convention was called to order at 4 p. m.

The PRESIDENT. I do not see any members of the committee on order of business, and we will proceed with the discussion on industrial education. Is there anything further to be said upon the subject?

Mr. DABNEY. I want to say just a few words, by way of suggestion, about a difficulty which is growing worse every year in my experience. It is the difficulty arising from the confusion of terms used in the nomenclature of scientific agriculture. I cannot go through the whole nomenclature of the sciences to illustrate my thought, and will only take up one subject, the subject of agricultural chemistry, and in that subject I wish only to refer to one single case—the nomenclature of phosphoric acid. I suggest that, to solve this difficulty, our Department of Agriculture here, through its experts in the various departments of science, formulate some simple short terms covering all scientific expressions most frequently used, and send them out with their recommendation that scientific writers, so far as possible, in writing for farmers, use these simple terms, instead of the various chemical terms, and the various natural history terms, that their fancy, or taste, or scientific skill ordinarily leads them to do. A friend of mine, the secretary of the National Fertilizer Association, has compiled a very interesting table on this subject. He took the laws on the subject of fertilizers in the various States and compiled into one table the scientific terms used in these laws to express the various ingredients of fertilizers. I shall only speak of the terms applied to phosphoric acid, and I wish I had his table that I might quote some things from it, but it is sufficient to say that having therein given the terms used in twenty-one different States, referring to phosphoric acid alone, he did not find for soluble phosphoric acid—using the commonest terms for reverted phosphoric acid, and for soluble phosphoric acid, and for insoluble phosphoric acid—he did not find a single instance where two States had used exactly the same term; in short, each one of the twenty one States had some variation greater, or smaller, in the terms used. Now, that produces a great deal of confusion among the farmers.

What is a scientific term as looked upon by the farmers? It is simply the name, or sign of an idea. The farmers have, by education, got certain ideas associated with certain terms or names. If that be the case, and it certainly is the logic of the matter, then it is simply throwing away words—it is almost criminal to change these names for ideas, and it will create the greatest confusion if every different writer uses a different term. The agricultural papers throughout the country always quote from the various scientific reports. They have to use the language of these reports in order to be sure of not mistaking them. For phosphoric acid I have heard many different terms. If we take the single term reverted phosphate, sometimes we have the single word reverted, sometimes precipitated, and it is sometimes known by the outrageous German expression "back gone" (zurueckgegangene) phosphâte; and the last term I have seen used was citrate, or citrate soluble phosphoric acid. Now, if the farmer learned one expression, he would recognize it every time it came along.

There is another objection. It produces an infinite confusion and difficulty in the trade in fertilizers. If we take the laws pertaining to the fertilizer trade in the various States, and compare the regulations which they lay down with regard to the branding of fertilizer bags, we find that no two States have the same terms. One says soluble phosphoric acid, one soluble phosphate, and others say precipitated and reverted phosphoric acid. No two States have the same term. That is very unfortunate. You cannot teach the farmer to understand these differences; he thinks we are talking about a different thing, or else we have got to keep explaining. We cannot go to every farmer and explain that these terms mean the same thing. We cannot explain to him that insoluble phosphoric acid or insoluble phosphate of lime is the pentoxide of phosphorus combined with three parts of lime; chemists understand all that. I only throw this out as a suggestion, and it seems to me that a great deal needs to be done in this direction.

Mr. ROBERTS. I was not present yesterday at the discussion on industrial education. Permit me to say that I have been connected with two different colleges, for the last twelve or fourteen years, in which industrial education was taught. One of them was in the far West, and the other in New York. I have studied this problem very carefully, and am still open to conviction, but I have certain views on the subject, and with your permission I will try to state them, very briefly. I lay down the proposition, first, that in the industrial school should be taught that which the student cannot get as well somewhere else. I have long since come to the conclusion, that under ordinary circumstances it is a waste, a very serious waste, to try to teach the student to plow, and to milk cows, and break oxen, and dig stone during a course of four years. That primary instruction the student should have, as all other primary instruction, at home, where he can be under the direct care and supervision of his parents. The Lord has set the people of the earth in families, and, unless there is some good reason, let us keep them in families just as long as we can. If our colleges are to teach, simply, so that we are to make plowboys, then we should teach the multiplication table also, for they go hand in hand. Here in the United States, happily, the farmer's boy is born on his father's farm, and he is under the same protection and instruction of a good practical farmer, and all the rudiments of agriculture can be more easily gained there than at any other place. Now, he is prepared with his arithmetic and algebra and these rudiments in agriculture to enter the industrial school. What shall he be taught? That is, what is the wisest disposition to make of the time while there? Teach him that in agriculture, which his father was unable to teach him, or which he could not get on some good farm and get $2 a day for it. I can say to you, to illustrate, that we have a freshman—the only one in the freshman class at Cornell—that was brought up in the city. He is on his uncle's farm now learning to plow, to mow, and to reap. When he comes back to Cornell I will try to teach him why we plow, and why we plow sometimes deep and sometimes shallow, and why at certain periods of the year—things perhaps he may never have thought of. Then, too, we are to teach the student to think, and even then, though the students have the rudiments of agriculture before they enter the university, we shall turn out boys who do not know all of agriculture—all of the manual part. I doubt whether there are three students among the graduates of all the agricultural colleges in the United States who can lay well the worm of an old Virginia rail-fence, unless he learned it of his father.

Circumstances change, and some are surrounded by certain conditions and some are surrounded by others. There can be no rule laid down that can actually express the undivided opinion of this convention, and, while thanking the Lord for all the varying climates and conditions of this country, we should try earnestly to study this question and see how we can best utilize the force at hand. Now, Mr. President, it strikes me that what we want in these United States to-day, more than any other thing in agriculture, is a class of thinking farmers, who can farm a large farm successfully without robbing it of its native fertility, and who can not only do that, but can take a farm that has been robbed of its native fertility and restore it so that it shall blossom as the rose. As I ride through our own empire State I see its grand hills, once fertile, covered with daisies—a result of spoliation. That is the kind of agriculture we have. As I traveled three years ago over the fair South I saw her lands neglected, and the old-field pine asserting itself on every hand, because there had not been thought and ability enough brought to bear upon the subject of how to farm so that the land might be handed down, in prosperity, to the children and the grandchildren. Children play on the streets to-day who will wake up some morning, not far hence, and find a hundred million of people wanting breakfast, and they will have to be supplied. It soon will become a serious question how to feed this nation, and a hungry people have no sense. How shall we best utilize this time? Let me tell you how I am trying to educate a boy: I have some of them—one of them old enough to be in college—who says he wants to devote his life to the elevation of agriculture. Well, if he does not get any higher than his father he certainly cannot elevate it very far [laughter], but he must go a step farther. So I put him on a farm among my work when a boy, and he learned during his vacation to milk cows, to ride colts bare-back, to pull stumps, to dig stones, and to hoe corn; and then it may shock some of you that a boy who expects to devote his life to agriculture should study Latin, or indeed political history and political science. Strange course, was it not, for any boy who wishes to spend his life in the direction to which I have alluded? But he will graduate in that course in two years. To-day he is putting up self-binders in the largest reaper manufacturing establishment in this nation, and he is becoming an expert there. He can get more knowledge of farm machinery in that shop, than he can get at Cornell University, although we have a machine-shop 200 feet long, equipped and furnished probably as well as any machine-shop in this latitude, but it has only been recently that I could say that. When he is through his four years' course, and has been broadened, and taught to think, so that he will know what his instructor is talking about, then he commences with agriculture. Well, now, you will see that I will educate him for the farm. I do not see present to day some of our Cornell boys that have been educated for the farm. There are some who have not been so educated. For the country there, the conditions are different. I am talking from a different point of view, because our conditions are somewhat different from those in the far West. We want to keep the problem carefully in view, how shall we make the best of the material at hand? Now, in the mechanic arts, I will admit that there are no places where that boy can go to-day to get a good training. We should have preparatory training schools or shops all over the land—little ones—where a boy can go and get the rudiments. The subdivision of labor, in our modern workshop, is such that the boy can get only a fragment of a trade.

Again, Mr. Chairman—but I presume I am getting beyond my time—though I have only one more thought.

The PRESIDENT. Proceed, sir.

Mr. ROBERTS (continuing). It seems to me next to impossible to give a large number of students good instructions in the manual of agriculture on the farm at the university. I remember, Mr. President, when I had 80 students who were bounced out of the breakfast-room at 7 o'clock in the morning all to be set at work, all to be guided by myself. We were organized well, had good captains, the boys were in squads, and so on, but what did they do? One squad went to shovel in the barn-yard, one to make roads, one to shovel dirt, another to plant corn. We had a good planter in the barn, but we could not find employment for our students unless we covered with a hoe. We paid 9 cents an hour for that work, such as we could find. Some of those boys after graduation have made eminent men, I have no doubt. It was impossible, however, to give those boys any understanding at 9 cents an hour, because we could not keep so many students at work profitably. At Cornell we give boys 15 cents, but they milk for the money. I gave another boy 20 cents because he was superior to my dairyman, but when the class in agriculture go out to study agriculture they get no pay. Again, I suppose that all the appliances necessary to the highest attainment of agriculture cannot be gathered at any one university, however rich. I believe we must come to the practice of taking our students to the best farms and the best herds and let them study the domestic animals under different circumstances and different treatment, and come in contact with the various problems during their college course, and with the blood that flows there, that they may feel its pulsations and be invigorated thereby. [Applause.]

Mr. LEE. I think one reason why our agricultural colleges do not turn out more graduates who are farmers is the fact that we overshadow the farmers. As a rule these agricultural colleges are not in sympathy with the farmers as they ought to be, and it seems to me that the management of these colleges have neglected this feature very much. Any institution can benefit the class in whose interest it has been created as long as it has the sympathy and support and encouragement of that class; and it should be the duty of the management of these institutions to establish this sympathy between the farmers and the college itself. Now, I do not think it is the duty of these agricultural colleges to turn out strictly scientific farmers, but they should have a thorough knowledge of all the principles underlying agriculture, the fundamental principles which every farmer of ordinary intelligence should have, and then, in addition, he should have a fair education. When the colleges accomplish this much in its graduates, giving them a fair education, and a thorough practical education in the sciences which underlie agriculture, and when, during the collegiate course, the students have not been weaned from sympathy with the agricultural class, I think the successful crusade will have been accomplished. And those are the graduates who will revolutionize farming in the various States. Now, it is necessary to have a class more highly educated than those I have named, who are strictly scientists and who can be professors and instructors in the colleges, and who are capable of conducting scientific experiments. Now, with reference to the labor of students: If you take the student and send him to college for four years or six years, and he does not know manual labor and has been weaned from sympathy with those who engage in manual labor, it is hardly to be supposed that he will be in sympathy with those who may teach manual labor.

There is another matter, and that is the expense of paying students for their labor. Why, Mr. President, all education is expensive; there is no education that is not expensive, and no education is valuable unless it is expensive. Last night I illustrated, by the Military Academy and the Naval Academy at Annapolis, because my training had been that of a military man, and I am more familiar with military surroundings than with those of other institutions; you go to West Point and you will find that the staff which teaches the technical part and the military part is as large and possibly more expensive than that which is employed in the other departments; and, sir, it is necessary. You cannot graduate an officer at West Point who is a thorough officer unless he has all the academic instruction, and the scientific instruction which is deemed necessary, and he must have the military drilling and every kind of instruction in guard duty, and everything of that sort. Why, sir, the technical instruction costs more than the instruction in the academic department. Therefore, I think it has been very poor policy in the management of these agricultural institutions to grumble about what you have to pay students for work. Why, sir, is there any return which West Point makes for the equipment—the artillery, cavalry, and infantry equipment—which is furnished? What return, sir, has the Government for that expenditure, except the instruction which the graduate receives? Where that technical instruction is carried out loyally to agriculture, it will bring about the same result, sir, as is brought about at West Point and Annapolis, in our agricultural colleges, engineering colleges, divinity colleges, or in any other school for technical instruction. Therefore, sir, we must not expect when we pay our students 8 cents or even 20 cents an hour, that that money is lost; it is expended in the education of these men. We may not see it now, in the milking of that cow, of which my friend has spoken, but the student has preserved his sympathy with the class from which he is supported—which has this work to do.

Mr. Knapp. I want to speak, Mr. President, on one or two points. There are so many features that I shall not dare to touch upon more than one or two.

I indorse all that Professor Roberts has said and said so well; but it must be understood as relating to a school under the peculiar condition and organization of that great university to which he is so honorably related. We are of necessity obliged to look to such colleges for trained men, not so much to go on the farm as to take the higher line of agriculture—agricultural professors that have been eminently successful in their work; but out in that country which Professor Roberts has kindly designated as the far West, but which we think is the pivotal point upon which the continent turns, we need a different state of things. We are brought face to face with the farmers and generally met with the pertinent interrogation, "What are you going to do about it, and what are your students good for in the practical work upon the farm?" In other words, we are compelled to show that we can prepare men for foremen on the farm. Now, I am not one of those who believe that it is an easy thing to be a foreman of a farm, and that because a man has happened to graduate at some college therefore he ought to be a foreman and can be a foreman. I take it for granted that if a man has sought the position of a foremanship and has not been able to find such a place, he is eminently unfit for that position, because the demand is everywhere, and I think I stated it far within bounds, when I said last night, that I could place nine or ten such men at once in good positions; but what is generally meant by foreman, and what I mean by foreman, probably were two very different things. I meant a man that was a good scholar, sufficient at least to keep all the books and wisely direct the farm, as an intelligent man, and a man who could undertake and thoroughly understand all the operations of the farm.

Now, it has been my fortune—perhaps I have been unfortunate in this regard—to come in contact with fifty men who claimed to understand the science of agriculture, and to be educated as agriculturists, and not one of them was competent to feed pigs. It is a difficult thing in these cases to find sense and science combined. It is a difficult thing to find a man who at once understands the management of stock and who can produce animals of the highest order without impairing the vitality of the herd. It is a hard thing to stuff them, and round them out, and to produce perfect symmetry in lambs or horses and yet preserve the highest vitality. It is a difficult thing and a rare accomplishment, and for that kind of a man I have a place, not for one, not for ten, but for a great many more, and I will sign a contract agreeing to put them in place and you may go out and hunt for them to-day, even as old Diogenes with a candle hunted the streets of Athens. We are compelled to confront that question. I know it involves a great many things. I will name one or two. The time was when we could find work, but now, in our country, our farm work is done by machinery. If we should set a boy to hoeing corn, we should teach him to do precisely what he ought not to do, and what I have never seen done in our State, and I expect it is not necessary, because we have a better way. We used to plant our potatoes, and we did it by hand work and made it profitable. Now our man starts the potatoe planter and puts in his 5 acres a day, placing one part of a potato in each place, doing it a great deal more accurately, and covering it and fertilizing it, all at the same time. It is so with the entire work. It has become a matter of machinery. Now, in order to enable teams and machinery to be employed to advantage the work must be continuous and planned accordingly. The foreman has not only to know how the work is to be done, but its value when it is done.

The standpoint from which we educate a man has a great deal to do with it, and I think that if a young man has milked cows, and sawed wood, and done some of those things, not a great deal perhaps, but enough of it to measure the value of a day's work and how much ought to be done in a day, that it is a very important part of his education, as a foreman of a farm. He must know when he is well done by, and when he is imposed upon, by his men. In other words he must be taught a great deal of the business of a farm, hence it is a very important matter when we come to consider how we shall proceed to accomplish this the best. We have our method, and while I do not claim it to be perfect, yet it is the best we can do under the circumstances. Just as Professor Roberts has wisely said, these young men need to have a certain amount of agricultural knowledge before they come to the college, and there is where we have done a very great wrong. We require one thing in chemistry and another thing in agriculture. Put them all on the same basis. If we require algebra, require practical agriculture up to a certain point. It is a good suggestion, I think, and one that has occurred to me a number of times as being important. Then in every line of agricultural investigation we require that there shall be a corresponding amount of work. We do not call it an agricultural training if a man shall dig potatoes the entire four years in order to get labor; but his labor must be in connection with his study. If he is studying dairying, that boy does the milking, that boy makes the butter, he and his assistants do all the work of the creamery—we call it a laboratory, for it is simply for instruction. We try to keep it as near on an economical basis as possible, because it is always wise that the product which the boy makes, whether it be on a farm or in the workshop, should be sold in the markets of the world, otherwise he would get a very slight notion of the value of his labor. Now, when it goes out and sells for a trifle more than it cost, it is reflected back and the boy comes to understand what he is worth, what his measure is, and the criticism of the world is worth a great deal upon his product.

When we come into stock-dealing, the management of the herds is under a superintendent, for the boys are not competent for that, and in each department we have a competent foreman to whom we can send a young man who is to work under him, and where he will always be under instruction as to the best method for handling herds. That necessitates a large farm. Then on Friday afternoon we go over the farm together. I take the books along. We discuss questions of farm economy as we go along, and consider what kind of a farm can with profit and economy carry buildings of so much value, and where buildings of greater value would be a dead load to a certain extent. Then we show where the buildings bear in a certain extent to the capacity of the farm for production. They come to understand that 80 acres of farm-land can carry a house of so much value, while a farm of 160 acres can carry more houses of more value and barns in proportion, and the houses and barns must not exceed a certain percentage of the production of the farm, lest you lose money. Here we come to a fence that had been built and which, according to the books of the farm, proves to have been unprofitable. I lost money there; that was unprofitable; and I criticise myself. I show where I was unwise, and the boys understand it. Here we made some money. And so, with the books of the farm, we go along and talk about the many operations going on about us—about timber, how to build fences, how to dig ditches, and so on. Now, you will say that cannot cover a great many students. That is very true. I think if we fit young men thoroughly to be foremen on the farm the number must be comparatively limited. The number of students brought together for definite and practical work, so that they can go out and learn something just as a graduate of a law school or a graduate of a college of medicine can go out into the world and learn something in their line, must be limited to a comparatively small number. I would say that possibly not more than sixty or seventy in one college could be graduated in that way. Of course the whole college can be given a good deal of agricultural training where the surroundings and influences can be for agriculture. I have said, perhaps, all I ought to.

A DELEGATE. At what stage in the progress of instruction do you commence the study of agriculture; I mean to teach agriculture as an applied science? I have found it necessary to have some preliminary instruction in the science of chemistry, biology, botany, &c. Do you precede your instruction in agriculture with some preliminary preparation in the sciences?

Mr. KNAPP. I am very glad you asked that question. From a scientific standpoint we should first build the foundations, and we ought not to begin agriculture itself until about the commencement of the junior year; but we are a little afraid of those boys. They come to school with big notions, and, strange to say, a great many of the boys get those notions from their parents. They say to the boys, "We have had to work hard all our lives and we do not want you to be a farmer, a hard-working farmer; we want you to go to school and get a good education and make your living easier." Now we put one class in general agriculture in the freshman year—the first term. That is very unscientific, but exceedingly practical; they say: "What is the need of our studying this? We don't see. We suppose we will have to take it, but it is not necessary. We were brought up on a farm." Now I devote the first term to dressing those young men down, to showing them what they do not know about agriculture, and when I have got them on the seat of repentance—on the mourner's seat—we are ready for the process of conversion [laughter], and I proceed then to show how, under new principles and the lights of science, a great deal can be accomplished on the farm. I go around the farm-house, pull out the draws, pull open the doors, lift the windows, and try to let the light of science in, and as the result we have thirty or forty young men thoroughly converted with regard to the nobility of agriculture and to the dignity of the calling which they had never known until that time. In the second year we attempt stock raising, that department of physiology which is one of the requirements, and in that department we must teach a little chemistry, and so we go throughout their course. I want, in other words, to go with the young man on the morning when he enters the college; I want to take him by the hand and hold it until he steps out on the morning of commencement, with his diploma, when I bid him good-bye for the farm and the home. [Great applause and laughter.]

Mr. GLENN. Is your farm self-sustaining; I mean do you make enough on the farm to meet expenses?

Mr. KNAPP. What, sir! do you mean to ask if our college is self-sustaining? No, sir; and I pity the poor God-forsaken school that is self-sustaining.

Mr. GLENN. We have had that idea expressed here, Doctor, but I won't admit that the farm that is not self-sustaining cannot recommend itself to the people.

Mr. KNAPP. The process is one of education, and the more nearly it comes to being self-sustaining the less education you put into it. Now if you ask one thing I will say this, we ask no money from any source whatever to carry on the ordinary business of the farm, or to pay the ordinary expenses of the farm—no money whatever. In order to meet just that thought, I divided it. The farm is divided into three divisions, the ordinary running of the farm, the new and valuable improvements to be made upon the farm, and the purely experimental work of the farm. For the ordinary running of the farm we ask no odds of anybody, for the new and valuable improvements and the purchase of stock outside of what we would purchase for the ordinary running of the farm—that is, stock for illustration, for experiment, they make an appropriation. Let that stand out distinct by itself. Then for the experimental work there is a separate appropriation. The farm more than pays its own expenses, and in addition carries the students' labor with it, that is, we pay the students for their labor, manage the farm, and the farm meets all its expenses, and will do a great deal more than that when the whole farm is brought up to a proper point. I do not think the farm ought to do it—we are compelled to do it at present in order to meet public opinion, and yet there is just this feature, the State does not propose to hand over the farm to be run in a visionary manner, and it is well that we should be brought to time financially, and the value of our work measured in dollars and cents. That is practical to a certain extent, and the liberality which calls it out, regarding it purely as an educational feature, is, it seems to me, a practical movement also.

Mr. ROBERTS. Do you require of all the students of all classes now in the Agricultural College the performance of a certain number of hours' work a day?

Mr. KNAPP. No, sir. It is different from what it was when you were there. We are now——

Mr. ROBERTS. Very much better, I understand. [Laughter.]

Mr. KNAPP. Well, I do not know about that. We unfortunately spread out into a kind of university. I regret it. I wish we had kept in our line. Now, Cornell College is wisely a university; I am glad of it and do not want it any different; but our work has to meet the wants of our State. I would have been glad if we had kept strictly to the mechanical and agricultural divisions.

I found this difficulty when I first went there: Every boy came down at 1 o'clock for orders for work. Well, as they came in—two hundred boys—I, a lone man, undertook to saw myself into two hundred pieces, sending a piece with each division of the boys. They insisted that they must have instruction in everything that they did. That would require me to make so many subdivisions of myself that it was practically impossible to accomplish much good, and I said, "Let us use some common sense; the farm is on the same basis as other departments"—that is, agriculture is on the same basis, as it had been your habit that it should be on the same basis. Very well; when your student comes to chemistry you let him work in the chemical laboratory, but you don't let any others work in the laboratory, do you? Then your work relates purely to the instruction; some work in entomology, some in botany, and some in zoology. Now, I said: Put agriculture on the same basis; let us take those who are specifically studying to be farmers, and let us have our farm course, and they can work on the farm, but the boy that is simply working to earn his 10 cents, the boy who is brought up in the city and hopes perhaps to graduate and be a doctor or lawyer, while here I want him to work in the doctor's office or the lawyer's office and get his 10 cents from those divisions of the college.

Well, the moment that was agreed upon I had the best class of young men I ever saw, whilst when I had the other class it was a kind of irresponsible affair, as you very well know. That was when we had the class of young men who did not want to work, but only wanted to loaf around and get 10 cents an hour for it; but this effected a conversion.

Mr. LEE. Mr. President, Professor Knapp has used the word "conversion" here several times. I would like him to explain what is agricultural conversion. [Laughter.]

Mr. KNAPP. I do not know myself. There are some things that are difficult to explain generally which we know are true. We believe in the agency of the higher powers, but we cannot explain it very well. Now, it seems to me something like this: I have talked about conversion. I have intended to do so intelligently. I find a good many men are theoretical agriculturists; they believe in the general principles of agriculture, and they love farming, and so on. Now, they are entirely honest in that. But somehow, when the great thought of agriculture comes to them, what a stupendous problem it is—that it is the concentration of all the sciences meeting in air and in earth to work out the great destiny of production and the great destiny of man, as a citizen in the country in making the earth produce to its utmost—now, when he conceives what an immense amount of good he can accomplish, how he can turn all this force to build up a grand society in the country and make the country so beautiful and so worthy and make man so respectable; when he comes to conceive of all these forces, it takes hold of him and shakes him and thrills him with the thought, and thereafter he is an enthusiast for labor and the dignity of agriculture; he is always on the floor ready to combat anybody that says anything against it; he cannot restrain himself from rough expressions; he feels it all over, rather than theoretically indorses it. In other words, he is in the amen corner of the whole business. [Laughter.]

Mr. GLENN. I was here last night, and I asked a good many questions, wishing to make these talks as profitable as possible, but with the design to bring influence on public opinion. We have been talking here about co-operation. I am very earnestly in favor of that, and I am very anxious that we should agree as near as practicable when we go before the public. But, unfortunately, we are very wide apart in some things.

I have asked some parties here about work on the farm, and they tell me that they do not believe in that over in our part of the country; that they believe that these colleges are intended simply to teach. Another says—I have asked a number—that "our farms, that is, the farms of the colleges, are intended to teach agriculture, and we work only as much as is necessary to teach it." Two others here, I believe, have insisted that we give such attention to practical work as to give skill to students on the farm and in the shop. We are not together, evidently; indeed, we are very wide apart.

Down in my country we have some severe battles to fight, Mr. President, and I hope some of these gentlemen who have the public so well educated up in this part of the Union, and above here, that the public will come to them and they can control this public sentiment, will unite themselves and come down and help us, for, unfortunately, in these attempts the public are a good deal in advance of the teachers. They are very earnestly demanding that we send the boys to the field and keep them in the field until they have studied agriculture there very thoroughly. Indeed, there was a committee from the State capital who wanted to take our funds away from us because we did not keep boys in the field at least five hours a day, requiring it of them—not simply inducing them and urging them to go there, and paying them for their work, but making them go there. We told them we had tried that; we told them that those old labor schools had been tried and they had all failed; we were trying to get the boys interested in that work, and we hoped we had succeeded with some.

The next question they came at us with was this: "Does your farm pay?" I told them: "Well, yes, sir; if you mean the model farm simply, it pays." I had taken that precaution when I first went there, and I do not believe I am ashamed to say it, that I meant to put some of the best part of the farm out on the road where farmers could see it [laughter]—where they could see that model farm—and I put it there, and I made that model farm pay its expenses. I tried to keep the account the best I could, but I could not keep it always separate from the other, because my boys who would work on the model farm were called off to make some experiments. We did the best we could, and I answered them, sir: "Yes, the model farm pays, but if you ask me about the experiment station I tell you, no, sir; no, sir; that every experiment I make there costs me at least $3 over and above the income;" and one year they cost me about $5, but we have a separate fund for them and a separate stock fund. That does not pay always; it failed this year; last year it paid me about $60. One year it paid more (it cost only about $1 a day to feed them), while I got a little manure over that. But, sir, it does not pay generally.

I want to meet the arguments of the people down there. Some of our people had visited the North, and they came down there and told me the most wonderful stories about that Michigan work. I studied it earnestly; I wanted to get at the truth, if it was there, and if the best plan was there I meant to follow it and get my people to do it. Well, another one had been down in Mississippi and they literally ruined me with Michigan and Mississippi, crushing me, sir, between the Northern and Southern mill-stones. [Laughter.] I am so badly mashed I do not know what I shall do about it, and I came here to get help. I have been paralyzed; I want to hitch on to somebody. [Laughter.]

Mr. FAIRCHILD. Come to Kansas. [Laughter.]

Mr. GLENN. Yes, I have heard of Kansas, and I believe it is a good school, sir. I do not doubt about the others being good schools.

But we have some people down there who want to study Latin, too, and they talked to me about turning in part of the money appropriated to teach agriculture and mechanics. Well, sir, when that was proposed there was such a storm that we had to leave like we were near a hornet's nest. We had to run, all of us, from the storm. And they came to me with these stories, and these members who were fighting for the money in the classical course came to me with it.

Now, a farmer came to me the other day and said: "I have brought my boy here to school and want him to learn all your better methods; he has been an agriculturist from the time he was five years old, and he has been a practical agriculturist, and I cannot send him to school but eighteen months; I have not got the money; I cannot pay his board more than eighteen months." Now what am I to do. He says, "I don't want my boy to waste his time chopping around on your little no account farm; he has been working here at home and knows more about farming than you do anyhow;" some of them will say that. [Continued laughter.] I was brought up on a farm myself and know something about it, but they don't know it, and they insist that their boys should not be kept on the farm working—they want them to learn something else. They want us to try in eighteen months to develop the poor boy's sense; the muscle of the agriculturist has been developing for sixteen years; for some of them come there when they are about twenty-two or twenty-three years of age. They want a little Latin, and some of them want a little Greek, too. We are divided as to whether it is better to have them all united, and I asked the question here the other night, whether it is better to separate our agricultural colleges from the others? We are divided ourselves on this subject, and the newspapers are discussing it and the newspaper men have the impudence to say that we put you on this track anyway—all this did not come from you. My friend Bishop always said it was the school-teacher who was always dogmatic. I always thought that sensible men would come together after awhile as they do; they may not come at the head, they may not be far-away leaders, but they are along among the first; they are the safe leaders. Now we should, if possible, unite our forces in trying to teach public opinion and protect ourselves, Mr. President. [Applause.]

Mr. MAURICE. Mr. President, I am rather glad that the Commissioner of Agriculture has just vacated the chair; for addressing him directly as chairman of this convention I would have felt some delicacy to make, in his presence, the short remarks that I am about to extemporize.

It is not my intention to reopen the now settled question of co-operation or union between the Department of Agriculture and the different experiment stations and agricultural colleges of our country, but I hardly believe that the scheme we have devised and adopted to that end will enlist the warm support of Congress. The creation of a periodical bulletin, quarterly or monthly, that will be filled with essays on agricultural topics and reports from the managers and professors in our experiment stations and agricultural colleges is not, in my opinion, commensurate with the great interests we have at heart to foster; and I am afraid the Representatives of the people will think it is hardly worth the while to appropriate the paltry sum needed.

I was wondering all the time, during the otherwise interesting discussion, why no allusion was made to the suggestion made by the Commissioner, in his opening address, concerning the creation of a "national experimental farm, near the capital, upon which he would establish a permanent national or world's fair, for exhibiting the products of this and other nations."

I was not fortunate enough to be able to be present yesterday, and consequently all I know about the creation advocated by his honor is the sentence just quoted, which I read in the morning papers on my way from Baltimore to Washington.

But I was thinking about it all the time the debate lasted, and if I could have obtained the floor, I would have tried to show to this convention that the problem we were striving at had been solved in a few words by the Commissioner of Agriculture. There is so much practical common sense in his idea that it veiled, so to speak, the grandeur of the scheme and the statesmanship it revealed.

What do we want? We want the Department of Agriculture to be a center of unity, of co-operation, around which the experimental stations and agricultural colleges will circle; we want a heart that will constantly cause new blood to circulate into the not overplethoric veins of our agricultural institutions.

Why, it is precisely the natural function of a national experimental farm. There the works, discoveries, and achievements of the various experiment stations scattered all over our great country will be counter-experimented, tested, approved, or rejected. When two opposite results should be obtained in the same experiment in two different stations, the national farm would act as an umpire, as a kind of supreme court of appeals.

In my opinion, there is no better link between stations throughout the States than the very national farm as suggested and sketched by our Commissioner, aided, of course, by the periodical bulletins to be issued from this office.

The more we examine the probabilities that evolve from this simple idea the more we are impressed with its brilliancy, grandeur, and practical usefulness.

Such a farm would soon eclipse the Soldiers' Home and become to our national capital what Central Park is to New York, Fairmount to Philadelphia, the Bois de Boulogne to Paris, &c. But it is not because it will be a favorite place of resort, a beautiful drive for the representatives of all nations, ours included, that I am so sanguine about its realization, though such a prospect is not without attraction with an American citizen who was born a Frenchman and who is not yet prepared to sacrifice the beautiful to the useful.

I go farther and assert that a national farm as conceived and sketched in the opening address would be eminently useful, because it would be necessarily beautiful.

It is also as a professor and educator of the American youth for nearly twenty-five years that I am enthusiastic about it. Why, gentlemen, what has been in all ages the link, the center of unity between collegiate institutions, but the university. And I say that our national farm, the park of Washington *par excellence*, would of necessity grow soon into a great agricultural university as sure as a well-drawn conclusion follows its premises.

See with your "mind's eye" the extensive and splendid buildings erected by order of Congress at the suggestion of the Department of Agriculture in the center of the experimental farm on a high hill. It will be a "permanent exhibition of the best products of all nations," of the best agricultural implements that the American genius is so apt to conceive and manufacture. It is full of life during the day, but in the evening, in the winter evenings, I see Commissioner Colman pacing the central hall justly proud of his work and muttering to himself the words of Horace:

> Exegi monumentum ære perennius.

Still he is not fully satisfied; he feels lonely in that magnificent hall. An idea will strike him, "Why not enlist the active co-operation of all the eminent country gentlemen who are so fond of agriculture and agricultural investigations, though their ranks may be filled with representative men of all the learned professions? Why not to have here, almost every evening, in this beautiful hall, interesting lectures on all the sciences and arts connected with agriculture, the mother and nurse of all arts, trades, and professions?" And what a field for eloquent scientists and agriculturists. Agriculture, horticulture, floriculture, the dairy, the apiary, the thoroughbred cattle, rural agriculture, civil engineering, chemistry, meteorology, mineralogy, geology, military tactics, mechanical arts, the law of property and real estate, veterinary science, the medical properties of herbs and plants we grow, painting of animals, landscape drawing. But why enumerate? I would sooner point out the very few arts and sciences, if any, that would be excluded from the curriculum of our great agricultural university. And think how such interesting lectures would be made essentially practical and instructive by the surroundings of the lecturer which would illustrate and exemplify all he would say.

Let us continue our Darwinian process of evolution.

A university requires students of some kind. Statesmen, Senators, Congressmen, politicians, judges of the Supreme Court, ministers and foreign ambassadors, are not the sort of boys that would give permanent life to our university, if they were to constitute the only audiences at our lectures, even admitting that they would be interspersed with the fairer part of their families and friends. We are too practical to be satisfied with only such students. We want real students.

Our regular students will be the graduates of our agricultural colleges who will swarm here and receive a finish to their collegiate education under the superintendency and control of the Secretary of Agriculture, for he is now a member of the Cabinet. As the head of the university he becomes the natural head-center of all the collegiate institutions especially devoted to agricultural knowledge, just what we want him to be——

[Here the hammer fell.]

Several DELEGATES. "Go on."

The PRESIDENT *pro tempore.* If there are no objections Mr. Maurice will continue. The Chair hears none.

Mr. MAURICE. Gentlemen, I will not abuse your kind leave; in fact, I have reached the end of my remarks, and it will be shorter if you will picture to yourselves Fairmount Park at the time of the Centennial. Do you remember the beautiful and elegant buildings erected on the outskirts of the park by the several States of the Union? Each one had characteristics of the State it represented, from the exquisite and picturesque log house of Mississippi to the elegant pressed-brick building of Maryland.

Well, imagine our national experimental farm delimited in an oval shape by a broad, magnificent avenue that could be used, not only for daily drives as any avenue of a park, but also for occasional horse-races when annual agricultural fairs are held. On the outskirts of the national farm, and bordering on the avenue which forms its limits, we divide the surrounding tract of land into farms of, let us say, from 10 to 50 acres, according to the population of the State to be represented. Each farm, whatever may be its area, will have naturally the form of an elongated trapezoid, the small abutting on the avenue. Now, upon that small end, a few yards from the avenue, each State builds a country mansion of its own, a kind of large farm-dwelling, capable of accommodating comfortably a household or family of from ten to twenty members.

Here the university students of each State reside and mess together; here they study, here they work intellectually and bodily, dividing their time between high philosophical studies and the actual work of farming; from there they walk or drive with their own horses and carriages to the lecture hall of the university. Here are their agricultural barracks, and they are all under a strict military discipline; for we must not lose sight of the fact that the nation requires, in exchange for a liberal grant of lands-crips to agricultural institutions, that military tactics should be taught there, besides agriculture and the mechanical arts; so that every graduate—I would almost say every agricultural officer—should be able to serve his country in time of peace and in time of war, *ense et aratro*, by the sword and by the plow. And for that purpose, the Secretary of War is required to detach a certain number of young commissioned officers, emerging from West Point; who, besides teaching military tactics, act as commandants of cadets and chief disciplinarians, with an authority and rank second only to the superintendent or president of the college, just as it is done at West Point and the Naval Academy.

Each State (or the General Government if deemed preferable) erects in the middle of the State farm, back of the main mansion, farm buildings, barns, stables, ice-houses, &c., and provides them with thoroughbred cattle and the best agricultural implements.

Each farm thus equipped is delivered up to the absolute co-operative management of the State students. It is their home, and all the profits of the farm are theirs. All the products in excess of the wants of the little farming colony are disposed of at the best market-prices; that the farm may be a dairy, a creamery, a truck farm, a tobacco plantation, a California vineyard or a seed farm. In the latter case, the Commissioner of Agriculture, instead of favoring private concerns that cheat him, would make it a rule to effect the purchases of seeds authorized by Congress exclusively from the young farmers, his pet wards; and if he has to pay liberally for it, at least he would have the satisfaction of knowing what he buys; for the seeds would have been grown under his very eyes, nay, he would have perhaps often on his table samples of the various fruits that the seed will propagate.

All the State farms are controlled in their interior management by regulations from the central government—the national farm and the Department of Agriculture. This feature of a strong centralization will please the Republicans, while on the other hand the Democrats will find the theory of States' rights respected to a great extent on each State farm.

The great rule is that each farm, whatever may be its aim, shall be a model farm of its kind, a standard of the progress realized in every branch of agriculture, horticulture, &c.; above all a model of elegance, of neatness, of comfort to all connected with it, from the lordly managers to the humblest farm hand, white or black. It must be also a well-paying farm, for I do not believe in those sham farms, those costly concerns which, under the pretext of fostering agriculture in our agricultural colleges, only teach the boys how to sink and waste large sums of public moneys, to the great disgust and scorn of the farmers. The first requisite in a model farm is to yield fair profits, for the prime object of a tiller of the soil is, during sunshine, to make a comfortable living for himself and family, and to save something besides, for rainy days.

The university students may adorn it to their hearts' content, make it as elegant as skill, tact, and artistic taste can accomplish, but in the end they must make a good living out of their charge, and not expect that their State or their families will spend a cent for their sustenance while receiving the broadest and highest scholarly education in every branch of scientific and literary knowledge; their minds will have to alternate with their bodies. They will have to work manually for their support, whatever may be their private means and however wealthy their parents. No room for drones, all must be busy bees. There is no disgrace in it. On their respective farms they will be so many princes and kings, fully independent, or rather dependent only on Him who dispenses sunshine and rain. Even the sons of millionaires should come there without pocket-money.

Still, gifts to individual farms, or even individual students in the nature of full blooded colts, thoroughbred Jerseys, Ayrshires or short horns, Cotswolds, Berkshires, elegant carriages and teams, steam-reapers and mowers, bee-hives, fertilizers, and phosphates; the erection of improved barns, stables, conservatories, ice-houses, with the names of the donors, and such trifling mementoes, shall not be against regulations. On the contrary, they will be welcome from all hands, statesmen, noted agriculturists, senators, governors, manufacturers, &c.

The national farm may become a fashionable resort, provided the *belles* of Washington, the society, have no objection to see their beaux—the sons of statesmen and congressmen—working on the farm in high boots and shirt sleeves; to see their future husbands plowing, harvesting, reaping, mowing, making butter, repairing the fences with their own aristocratic hands, just as an ordinary farmer. If, at such a sight, they exclaim: "Shocking! shocking!" then they had better not visit the farm at certain hours of the day; they had better, the fair ones, wait in the parlor or the ball-room for their admirers to come in dress uniforms with strapped swallow-tail coats. For, if I understood the Commissioner, his national farm is to be *a farm*, first and last. Upon that rock has he built his national agricultural church, and all the gates of fashion shall not prevail against it. No fancy trees in fancy shapes, but fruit trees, bearing luscious fruits; no strange and ugly animals or reptiles; amateurs of such exhibitions can enjoy them in any great city with park and zoölogical garden, or at Barnum's. Here we have real horses doing real work, real cows *cum uberibus plenis* giving real milk and butter, with real farmers to attend them.

Of course religious and political differences will have nothing to do with our institution. Senators and Representatives may have their enjoyable and mixed-up picnics, but they will have to leave home their political essays. The Horace Greeleys of any political creed will be allowed to speak on our sacred ground only on "what they know about farming;" that it may be much or little, it matters not, provided it is rural.

But, "vanity of vanities" of all human schemes that pretend to exclude politics! Politics will always find their way in the best directed plans to drive them out. I see clearly in the future, on the very soil of our farm, States arrayed against States; a solid North against a solid South; a solid West against both North and South. I anticipate great battles between the students of the different States of the Union for supremacy; hoes will be used instead of swords; mounted plows in lieu of howitzers, in those sweaty, but not bloody wars.

Who knows? In that fierce sectional strife the South may beat the North in manufactured and canned products, and the North inflict a severe blow on the South in progressive farming. New Jersey may beat California on wines; and the *bourbons* of Virginia defeat those of Kentucky. The students of the very State of our Commissioner, the Missouri *wines* may be relegated at the foot of the agricultural ladder. Such results of a pacific scheme are certainly awful to contemplate, even at a distance! But they are among the possibilities of the Commissioner's plan, and though an enthusiastic admirer of his scheme, I could not honestly shut my eyes to this last possibility. I candidly admit that only drawback, and still, in spite of it, I say in conclusion: Let all of us, friends of agriculture, unite with him to urge its realization upon Congress. A slice of the millions with which Senator Blair is embarrassed will be sufficient to give to our nation, near its capital, one of the most practical, one of the most beneficial institutions that was ever devised for the benefit of the whole people, of all classes, high and low; millionaires and farm hands. By all means "let us have a national farm" first, and then leave to time to evolve from it all its possibilities and probabilities.

Mr. ROBERTS. The gentleman from Tennessee, I understand, thinks we ought—or I imagine he so thinks—ought all to teach alike. Now I can conceive that in this broad country we will crystallize around the different centers in a different way. Cornell University is quite a different university from the one at Harvard. They are both good. There is no doubt about that, and no one will dispute that we have a valuable school in the Michigan College and another valuable college in the State of Iowa. They have crystallized around their respective centers, and

I believe they are doing the best possible under the circumstances, and I find no fault with them. I think that the Michigan agricultural college, by ignoring the mechanic arts, while its funds were low, did the wisest thing it possibly could do. I am glad to see they now have the mechanic arts and have a mechanical school also. My friend on the left [Mr. Knapp] is situated under quite different circumstances from my friend here in front [Mr. Willits], but in either State they are doing an honorable work. New York undertook a school just like the one in Michigan. It died a natural death, for they were not ready for it there in that great manufacturing country with its large cities, its varied wants, its constant change and interchange of condition and demand. Consider what we had twenty years ago, and compare it with what we have to-day. Look back over the twenty years and, see the progress we have made. Don't be discouraged. I want to ask this question not to prove that Cornell was right, or that Michigan was right, or that Iowa was right, for I believe they are all right, I want to ask are we using the facilities in our hands so as to produce the best results possible, or are we trying to work on too low a plane? That is the question I ask. I do not care to discuss it. Now, these gentlemen here at my side, these two honorable professors have honorable and noble boys to deal with. I have snuffed the breezes of the wild prairies, and I know what the prairie boy is, because he comes from thrice-selected royal blood. His old grandfather left his home and friends so near and dear in native lands to battle with the rocks and Indians on New England's hills. His father, with no less courage, and increased faith in the destiny of this great country, shouldered his gun and wended his way through forests and over mountains to the rich valley of the Miami. Now, the bravest and the best educated son of that brave scion stands on the wind-swept prairies of the West, noble browed, bronzed cheeks, stands there bare-footed, perhaps thinking of a pre-emption soon, and not of Greek roots—although he may have studied Greek in his day—but how among this prairie grass he may establish a home in the wilderness. There he stands with a character as honorable as Grant's, and with a heart as tender and as big as Lincoln's to do battle for God and man, and to do it manfully either in the very lowest or in the highest walks of life. Of such men is the great West composed. I do not wonder that you are proud of them. They will make men. Give them all you can; give them everything you can, and send them out with such an accelerated force, with such knowledge that it will only cease—no matter whether they live for the higher in agriculture or the higher in everything else—it will only cease with death. [Applause.]

Mr. WILLITS. I move that we adjourn.

The PRESIDENT *pro tempore.* The chairman of the committee on the order of business desires to make a statement.

Mr. ALVORD. The members of the convention seem to have somewhat misunderstood the action this morning about the use of the word "evening" in place of "afternoon" or "night," and a misunderstanding therefore exists as to whether we are to hold a session to-night for business; therefore the committee desires to submit that question to the meeting at the present time, remembering the action taken already, that after the final adjournment to-day, whenever that shall be, no further business shall be transacted. The question is whether we shall go on with business now and close it up, or have a business session to-night.

The PRESIDENT *pro tempore.* The convention has heard the statement of the chairman of the committee. What action will it take?

A DELEGATE. I move we go on.

Mr. KNAPP. That is scarcely possible. Considerable numbers are compelled to go to the city who would be glad to return and attend an evening session. I think that is the case with so many that we shall scarcely be able to complete the session at the present time.

Mr. CURTIS, of Texas. I would like to state that at the business session this evening, it is understood that there are several resolutions to be brought forward. I believe the originator of one of these resolutions is not present now, and will not be present until 8 o'clock this evening. I mean Professor Dinwiddie, of Texas.

Mr. ALVORD. Professor Dinwiddie's name is on the list.

Mr. SANBORN. There are some gentlemen here who wish to know what is the purpose of the convention in regard to the future, so that they can make their arrangements about returning to their own homes; and therefore I move that when the convention adjourn *sine die*, it be to-night at 10 o'clock.

The PRESIDENT *pro tempore.* A motion is before the convention which, if that should be adopted, would supersede this; the motion is that we proceed with the business in hand to complete it at the present session.

Mr. SANBORN. As soon as that motion is disposed of I will renew my motion.

The PRESIDENT *pro tempore.* As the chair has stated, that motion, if adopted, would supersede the motion already pending.

Mr. SANBORN. If that is the case I will withdraw the motion.

Mr. DABNEY. I seconded the first motion, but I will withdraw it, and hope that we will go on now until 6 o'clock, and that at 8 o'clock we shall meet in business meeting again. I would like that the motion should be put in that way.

The PRESIDENT *pro tempore.* The seconder of the motion now pending desires to withdraw his second; if there is no objection the motion will stand without a second.

Mr. RILEY. Is the motion to continue business now without adjournment?

The PRESIDENT *pro tempore.* The motion was to continue the meeting now without adjournment.

Mr. RILEY. I will second the motion, then.

Mr. WILLITS. My idea was that we could not complete the business without a session this evening. I think we had better go and come at 8 o'clock and finish our business. I know that I have an engagement now half an hour past.

The PRESIDENT *pro tempore*. The way to meet that will be to vote down the pending motion. The pending motion is to go on——

Mr. SANBORN. Then, I move the motion I made as a substitute. I move that when we make a final adjournment it be at 10 o'clock to-night. [After a pause.] A gentleman asks that it be made 11 o'clock. Make it 11 o'clock, if you please.

The motion as amended was agreed to.

Mr. WILLITS. I move that we now adjourn until 8 o'clock.

The motion was agreed to, and then, at 5 o'clock and 30 minutes, the convention adjourned.

## EVENING SESSION.

The session was called to order at 8 o'clock p. m., Mr. Willits, of Michigan, in the chair.

Mr. ALVORD. The committee on order of business would state that it is their intention to press the business as fast as possible this evening, consistent with propriety. They hope to make room for some of the resolutions and papers on the list which they have in hand, and to provide for those which are crowded out. They ask the adoption at once of this resolution:

*Resolved*, That all papers in the hands of the business committee not presented during the sessions of the convention be referred at its close to the president and secretary of the convention, as a committee on publication for incorporation in the proceedings at their discretion.

A DELEGATE. I move the adoption of the resolution.

The motion was agreed to.

Mr. ALVORD. The committee present the following, submitting it for adoption:

Whereas there has been generally expressed a desire to perpetuate the existence of this body: Therefore,

*Resolved*, That the representatives of the several States and Territories and of the Department of Agriculture here present, be requested to designate one from each delegation, and that the thirty-one members so selected constitute an advisory committee on permanent organization, and that the convention then elect a chairman of this committee.

*Resolved*, That the chairman of the advisory committee be authorized to name five of its members, who, with himself, shall be the executive committee representing this convention *ad interim*.

*Resolved*, That the executive committee shall, co-operating with the Commissioner of Agriculture, determine the time of holding the next convention, provide a well prepared order of business and programme of exercises, and a plan for permanent organization, and that the programme be issued in connection with the call reassembling this convention.

The **President** *pro tempore.* You have heard the resolutions, gentlemen of the convention.

Mr. **Atherton.** Would it not facilitate business by proceeding here and now (instead of authorizing a body to select a committee) to select the advisory committee of five ?

Mr **Alvord.** This advisory committee is of one from each State and Territory.

Mr. **Atherton.** I thought it was an advisory committee of five to be appointed. The first suggestion was, that the body should proceed to have each State select one man, and that body of thirty-one should then, from their own number, select a committee of five. In hastily jotting it down to understand it I may have overlooked some point. My suggestion is, that as we are here now we proceed to select the advisory committee, and I would move that we now proceed to elect the advisory committee of five to remain a permanent committee until the next meeting of the convention.

Mr. **Knapp.** Well, now, Mr. President, before we modify the committee's resolution would not this be the better plan: Let the suggestion of the committee remain as it is, one from each State; then right here name the chairman of the whole committee; then you have a man to whom you can refer any dispute, and you have one man who would really do the business. Of course he can confer with the Commissioner of Agriculture, the chairman of this large committee. It seems to me that would be more satisfactory. I am not tenacious about it, but I believe I should like it better that way.

Mr. **Atherton.** The only objection to that, Mr. Chairman, that I see—it may be a better plan—the only objection that occurs to me is that so large a body is practically impracticable, and it is unwieldy. If you had a smaller advisory body they could more easily compare notes. They could be distributed to each section of the country.

Mr. **Alvord.** Allow me to make a motion that this body be perpetuated by the appointment of a general committee to be composed of one from each State and Territory; that the chairman of that committee be now elected, and that he be empowered to name from that committee an executive committee of five.

The motion was unanimously adopted.

Mr. **Alvord.** How shall that committee be nominated ?

The **President** *pro tempore.* I think the shortest way would be to call the roll of States and let any of the representatives present name the member to serve on the committee from his State.

Mr. **Knapp.** Suppose the names be passed right in to the secretary. Write them out and pass them in.

The **President** *pro tempore.* That might do; we will, however, call the roll now and see how that works.

The secretary proceeded to call the roll and the following-named gentlemen were chosen as the committee :

Alabama, Mr. Newman; Arkansas, Mr. Nesvra; California, Mr.

Dwinelle; Connecticut, Mr. Gold; Dakota, Mr. Woodhull; Georgia, Mr. White; Illinois, Mr. Peabody; Iowa, Mr. Knapp; Kansas, Mr. Fairchild; Kentucky, Mr. Patterson; Louisiana, Mr. Watkins; Maine, Mr. Fernald; Massachusetts, Mr. Goessman; Maryland, Mr. Smith; Michigan, Mr. Willits; Mississippi, Mr. Lee; Missouri, Mr. Sanborn; Nebraska, Mr. Wing; North Carolina, Mr. Dabney; New Hampshire, Mr. Blanpied; New Jersey, Mr. Cook; New York, Mr. Alvord; New Mexico, Mr. Lemmon; Ohio, Mr. Lazenby; Pennsylvania, Mr. Atherton; Tennessee, Mr. McWhirter; Texas, Mr. Dinwiddie; Virginia, Mr. Harrison; Wisconsin, Mr. Armsby; Arizona, Mr. Wise.

Mr. LEWIS. I was not present when this order of business was taken up, and I do not know really what it is.

The PRESIDENT. The gentleman's name was suggested, as the member from Georgia, on the committee on permanent organization of this body, and he has already been elected.

Mr. LEWIS. I rose for the purpose of putting in the name of a gentleman from whom you would receive much more efficient service. If it is not out of order, I would be glad to see the name of Professor White, of the State University, substituted for mine. He will render much more efficient service than I could.

The PRESIDENT. If it is your wish I will submit it to the convention. Is there objection to the name of Professor White being substituted for that of Mr. Lewis?

There being no objection, the change was made.

Mr. LEE. I nominate President Atherton, of Pennsylvania, as the chairman of that committee.

The nominations were closed, and Mr. Atherton was thereupon elected.

The PRESIDENT. Under the resolution, he has the authority to name five gentlemen as members of the executive committee.

Mr. ATHERTON. I desire to ask a question, but before doing so I beg to return my thanks to this body for the very unexpected honor it has done me, and to express my hope to be of service to it. I wish to ask whether the five be in addition to myself or four in addition to myself—whether the committee will consist of five or six?

The PRESIDENT. That was just what I asked of the chairman of the committee, and he says five besides yourself.

Mr. ATHERTON. And the Commissioner of Agriculture?

The PRESIDENT. And the Commissioner of Agriculture.

Mr. ALVORD. I have to report the following: That in pursuance of the discussion relating to industrial education, there are two papers in the hands of the committee ready for presentation, the first being by Professor Knapp, of Iowa, who, I understand, offers it to go with other papers without reading; the other is from F. G. Adams, of Kansas, upon agricultural instruction in public schools, which will also be not read, but handed over to the committee under the resolution, and the committee now ask permission for President Dinwiddie, of Texas, to offer a resolution upon industrial education in public schools.

Mr. DINWIDDIE. Mr. Chairman, the mention of president Adams' paper recalls to mind the fact that some months ago that gentleman—I believe it was the same gentleman from Kansas—distributed to certain educators in the United States, gentlemen who are particularly interested—interested especially—in industrial education, a circular letter containing inquiries as to the practicability of industrial education in public schools. This, to my mind, indicates at least that in Kansas, which is one of the principal agricultural States, the question has been agitated, and it seems to me that this convention should take it into consideration. We have recognized many obstacles to the success of the agricultural colleges in the various States, but it does not seem to me that proper recognition has been given to this one anomally—that the public sentiment of the students, or those who are to be students in these colleges, has not been formed for industrial education. It seems, therefore, that one of the great aids to industrial colleges or agricultural colleges which can be given by the action of the gentlemen who have taken part in this convention—at home rather than here—is to produce in the public schools such a sentiment or feeling as will send the children of these schools to agricultural colleges, and not to literary institutions of this country, as they are now doing. With that in view, I desire to present some very brief resolutions which I have drafted, and I deem it unnecessary to make further comment upon them, because I have condensed them in such a way that they will convey to the convention the ideas I have upon the subject:

*Resolved,* That industrial education should begin in our common schools.

*Resolved,* That such a beginning is eminently practicable if we limit its aims to the formation and development of a sentiment and taste which shall lead pupils into the technical colleges or into industrial pursuits.

*Resolved,* That this is to be accomplished, not by manual training, since the appliances for such training are not accessible in general to our common schools, but by the following means:

(1) By object teaching, with constant reference to illustrations drawn from the industrial arts.

(2) By reforming our school literature so that useful citizenship in the pursuit of productive occupations rather than political distinction shall be presented as a worthy object of the ambition of every American boy.

(3) By so changing the character of our school commencements and exhibitions that the honors of these occasions shall be attainable by students whose talents fit them for honest practical achievement rather than for mere recitation and sham oratorical display.

(4) By bringing in every possible way our common schools into sympathy with our industrial occupations, thus making them feeders for our technical colleges and securing their aid in solving the old problems of educated helplessness and overcrowded professions.

I believe they contain the substance of all the suggestions which I have to make.

Mr. SANBORN. I wish to second these resolutions, and in doing so I will say that I am very deeply interested in the matter presented in them. The State Teachers' Association of my own state, Missouri, recently requested me to present a paper on the relations of the school room to the farm. The objects of that paper were to lay before the teachers of the State the relations of intelligence and the public State school system of education to farm results, and as a result the State Teachers' Association, by resolution asked for the production of a primary text-book for the use of the public schools of Missouri. Thus you see what we have already done in Missouri.

Now, sir, my State has a revenue derived from the farm of $250,000,000 annually. I believe that if all the intelligence that has been acquired in the last fifteen or twenty-five years, as the result of the researches of the experiment stations and private researches of Europe and America were applied to our farming, the revenue from the farms of our State would be $500,000,000 in lieu of $250,000,000. When we consider the incalculable loss to our State in the last ten years of short-sighted farming, we are struck with the value of a general knowledge of a first principle, the course which farmers have pursued there within the last fifteen years having carried their wheat yield from 25 bushels on the average down to 12; from 33 bushels of corn down to 26 and a fraction; and in my neighboring State, farther to the west, they have sent the wheat crop down from 17 and a fraction to something like 13 or 14 bushels per acre, amounting in a hundred-acre farm to 400 bushels decrease in production in the short space of fifteen years, which at 80 cents per bushel would amount to $320 less revenue in that short space of time. How shall we criticize a system that produces such a result in that period of time? To my mind it is farming toward despair.

I know, as a gentleman said this morning, that farmers hold more or less in contempt what they term "kid-glove" or "side-walk" farming. They do not believe in agricultural science as applied to the farm, and they say there is not that wide scope, that dignity, to the farm that there is to the counting-room or bar. Now that is the very worst idea that can be instilled into the young mind. I think, sir, the text book—the primary text-book—will open up to the view of the budding young mind a broad field of profound inquiry worthy of its best powers. Such a text-book must teach the A B Cs of agriculture, and can be made a most formidable lever in moving forward the spirit of agricultural investigation, productions and love of farm life, and that it will advance the farm interests as no other force, or all other forces can advance it. Statistics show that the intelligence of European countries is the measure of its productions per acre. Therefore I am very strongly in favor of the resolution.

I did wish to say something on the general question of agricultural education. I am afraid that upon one or two points I should have to differ from many on the proposition laid down in reference to the work to be done at the college farm, and especially one reflection made by two gentlemen that success has not been achieved where the agricultural department has been attached to a university, and the reflection that success was not probable where the agricultural department was a part of the university. As a historical fact I admit it; but when I forecast the future, and call to mind the struggles in the past whenever any new departure in education has been attempted, and the struggles undergone until it took its place, I am willing to predict that the time will come in the future when these difficulties will be less, because agriculture is founded upon the sciences, and involves more than other forces of industrial education a knowledge of the sciences, and carries with it greater possibilities. I am as confident as of the morrow that the time is coming when agricultural education will be sought after and become popular. Then agricultural colleges may find advantages in union with strong institutions.

Mr. LEE. I do not rise to make a speech, but merely to say that this idea of carrying agriculture into the common schools has already been advocated in my State [Mississippi]. At a recent session of the board of trustees of the college, where we have 150 in the college class and 150 in the preparatory department, a resolution was passed to instruct the preparatory department in agriculture, and it also indicated that a book should be prepared suitable to be carried into the common schools of the State.

Mr. PATTERSON. I think the necessary bond of sympathy could very well be created between the agricultural colleges and the common schools by introducing the elements of natural science into the latter. That has been done in many of the schools abroad. It was introduced some years since into the schools in England, wherein are now taught the elements of botany, zoology, and chemistry, and an effort made with good results to bring the people into sympathy with rational progress. I would teach the pupil, and he is teachable at that period to a very remarkable degree, the elementary principles of plant and animal life. I would bring him into sympathy with everything that could develop an interest in all the great forces and processes of nature around him so that he would be in harmony with them. He would then be able to look upon a plant or an animal intelligently, and to comprehend in some degree the relation which exists between the lower and the higher forms of life. Thus you would put him on the direct road to become an intelligent farmer and to bring him into intelligent relationship to agriculture in all its varied forms.

Another means I might suggest, which we have adopted in our State (Kentucky). We have had exceptional difficulties connected with the establishment of our agricultural colleges which it is unnecessary to recite here. There has been for us with years a struggle for existence. We were at one time unfortunately attached to a denominational college. Some years since the legislature severed that connection, and since that time we have been repeatedly assailed. Still we are on rising ground. The plan to which I referred is this: There is appointed in each county a board of examiners by the county court. This board invites each common school taught within the county to send its honored pupils, its best prepared pupils, as competitors for free scholarship in the State college. It provides that a competitive examination shall be held by this board and that the successful competitor shall be entitled to free tuition in the college for four years. The object of this is to foster the State college. It enables it to strike its roots deep into the common-school system, and thus create a bond of union between the two.

Mr. ATHERTON. I understand that Professor Dinwiddie is not particular about the adoption of the resolutions, and I move that they be received and referred to the committee on publication, to be published for information.

Mr. LEE. I move the previous question on the adoption of the resolutions.

Mr. RILEY. Why not adopt the resolutions?

Mr. ATHERTON. If we are to adopt the resolutions they must be fully discussed; certainly I should have some objection to them, and I should want time to state my objections. I have no objection to having them received and printed, however.

Mr. LEE. If it will lead to still further discussion I will withdraw my motion.

The motion of Mr. Atherton was then agreed to.

Mr. ALVORD. The committee report back, after consideration, the resolution presented by Mr. Johnstone, of Kentucky, and, with verbal amendments, recommend its passage in the following form:

Whereas a considerable number of appointments from civil life are annually made in the Army of the United States; and whereas the organic law of 1862 under which agricultural colleges are established requires that military tactics shall form a part of the instruction in those colleges: Therefore,

*Resolved*, That the purposes of the law requiring military instruction will be materially served by making the appointments required from civil life for the military department, in as far as practicable, from the graduates of institutions where army officers are by law in charge of military instruction, and from those students who have completed therein the required course of military instruction and training.

*Resolved*, That the foregoing preamble and resolution be respectfully submitted to the Secretary of War and the President of the United States.

Mr. PATTERSON. In the absence of Mr. Johnstone, who submitted the resolution, I beg to read the following. It is a letter from an Army officer now in Europe:

MY DEAR SIR: Many of us think it would be an improvement upon the present system of civil appointments if the commissions were distributed among the graduates of the colleges giving military instruction. It would insure, for instance, something like a proper geographical distribution of the appointments to the appointees who possess intellectual training. The possibility of such a prize would doubtless seem desirable to college youth. This is the month of appointments. If the matter strikes you favorably would not this be a propitious time to get a new administration to consider whether such a system of appointment would not be a benefit to the service and the college. If the college desires it, I am prepared to commend it to the military authorities. Though of course while even a third of our Army officers are West Pointers the country is safe. Hoping you are willing to unite the colleges in an effort for the adoption of this principle in the system of Army appointments,

I remain, yours, very truly,

——— ———.

This is from an officer who stands high in the service. The matter has been mentioned to him, and he regards it as a great grievance that the Army is obliged to receive, as officers of the Army, men who have no aptitude for the places and who were so ignorant of their duty. I believe that the idea would be approved by a great many of the officers of the Army.

Mr. CURTIS, of Texas. Gentlemen, I would like to say that I hope that resolution will not pass—sincerely hope so. I want to say, in just as few words as possible, why. We have been through a small mill in our small State in the southwest corner of the Union, as I understand some of the gentlemen who have spoken to-day, especially the gentlemen from Tennessee and Kentucky, have. One of the main objections raised to our college in the by-gone days was that we were a military dude factory. By considerable mixture among the farmers—going out and ascertaining their views on this question—I found out where the trouble lay. The trouble was that the farmers realized that military tactics—the art of war—was very greatly in the preponderance; that agriculture, represented as it is by this honorable body of men before me here, was to be placed in the background, and that the polished bayonets were to stand in the front. Gentlemen said we had military schools there, and yet we had the sublime check, as they termed it, to stand up before the legislature and beg for an appropriation to carry on an agricultural college. That is one characteristic of the military, and nothing else.

What have we done? We have found it absolutely necessary to subordinate the department of military simply to conform with the spirit and letter of the United States law creating the colleges, and endowing them, and all that, including the clause, "Military tactics shall be taught." We have, I think, succeeded beyond our most sanguine expectations. Three years ago, entering upon my duties, I found we had a chairman who was working heart and soul with our cause. I found that our chairman was ready to back, not the military, but the object for which the college was justly created—legally; and not only in the letter, but in the spirit. By working hand in hand in this way we have gotten the farmers to believe finally that we are doing some good in the State. As illustrating this, I will say that the State grange and nearly every county grange in the State have indorsed our college and indorsed our work within the past year. Gentlemen, we think this a remarkably gratifying success, and for these reasons I sincerely hope that this resolution will not pass. I think that to hold out to young men—I do not know that I can speak so for the young men of the

North—but I earnestly believe that for the young men of the South, where we realize that their training has been not so much for flight as for temper and use in some department of the work of life, I sincerely believe that to hold out West Point as the acme of their ambition would be the ruin of this industrial education which we are trying our best to promote. I believe I am not the only man who stands here to-night and says that we do not want this military feature carried on in these agricultural colleges. I believe that many a man will stand up here to say, "Gentlemen, the military must not crush out the agricultural and industrial education."

Mr. SANBORN. The gentleman has stated the conditions that I wish to suggest, in a word. I simply rise for the purpose of asking gentlemen to think before they vote on this proposition. It is holding out, apparently, a glittering prize that might turn to poison. The position asked for boys is a position that to many is a glittering prize. We are asking for considerable in another direction; it seems to me it would be better, and safer, to attain that object first, than by trying to get all that we can see within reach and lose the whole.

Mr. KNAPP. I have been rolling this over in my mind ever since I heard about it. I came out here to exchange ideas with friends, and this was an entirely new idea. I knew that it had been pressed on every side that our agricultural colleges should be made training schools for law, for medicine, for divinity, and for domestic economy, and now it is wanted to make them training schools for the military department of the Government. I should like to amend the resolution by including the Navy also. We have a little pond out there, about 2 rods wide and 6 or 8 rods long. I have got an old scow on that with which I have made elementary preparations for a navy. I would like to add that to the motion, and if the friends are willing to admit that, I will vote for the resolution. [Great laughter.]

A DELEGATE. I second the motion. [Laughter.]

The resolution was not agreed to.

A DELEGATE. I move that that resolution be printed in our proceedings and published as rejected.

The PRESIDENT. That is not necessary, as it will be done.

Mr. ALVORD. The committee have about three more items which they desire to present, and then will offer the closing resolution in connection with the discharge of their duty. Of these three items we ask that Dr. Phares, of Mississippi, Dr. Dabney, of North Carolina, and Dr. Egleston, of the Department, be successively given an opportunity to present resolutions in their own behalf, with a few remarks in connection with them, Dr. Phares, of Mississippi, first.

Mr. PHARES:

Whereas the proposed act of Congress for establishing experiment stations, indorsed by the convention, requires that the diseases of animals and plants and their remedies shall be studied; and whereas the crops of the United States are damaged many millions of dollars annually by diseases, and the domestic animals also destroyed to the extent of other millons of dollars by feeding on such diseased plants; and whereas many people have sickened and died from the same cause; and whereas a well equipped national office for this study would be a most efficient means of more speedily reaching the desired beneficial results: Therefore,

*Resolved*, That the committee appointed by this convention to procure the passage by Congress of the above-mentioned act be, and is hereby, instructed to ask Congress to provide the division of botany in the Department of Agriculture with an increased force for the investigation of plants, and especially for a full equipment of the mycological section of said division necessary for investigating the cause, extent, and probable remedies of those diseases of plants caused by fungi.

I desire to offer a few remarks on the subject as indicating the importance of it. There are a vast number of these fungoid diseases attacking our crops, and, as stated in the resolution, the damage resulting to our crops annually, sometimes amounts to many millions of dollars, and not only crops but, as also stated in the resolution, our animals are destroyed to a great extent by feeding on these diseased plants, and our people are likewise sometimes destroyed by the eating of these plants. There is scarcely a week passes, sometimes almost every day in the week, that I do not receive communications on this subject with reference to animals that have been poisoned by eating these plants. These plants are being constantly sent me, especially from the Southern States as far up as the Ohio River. I learn that these fungoid growths are about as common in the North as in the Southern States. On the common beet we have no less than twelve of these fungoid growths; ten species are found on the strawberry, twenty species on wheat, plant and grain, thirty species on Indian corn, thirty on the potato, forty on the cabbage. It is true that many of these species are harmless and do not do any great injury to the plants, but others of them are extremely injurious and very destructive to the plants. We have some, for instance, which, when attacking cotton, cause it to drop off all its leaves and all its fruits, and not a single fruit is matured on the cotton in consequence. All of you have seen the effect of what is termed pear-blight; that is one of these diseases. Many of these fungi are not injurious to animals, but a large proportion of them are injurious, and it is important to ascertain what are and what are not injurious, both to plants and animals. Now we have several thousand species of these fungi all well known in the United States. Their effects are better known in Europe. Very extended enzootics have prevailed in various parts of Europe which had their origin in fungoid growth. We have authentic accounts extending back long previous to the Christian era, and we have accounts, in the United States, of damage produced many years ago by these fungoid growths to plants, and animals and people also. These growths of fungi appear in various forms; a single species in different phases of development presents different phases, and in order to destroy them, in order to prevent their growth and their spreading, they must be studied in their different phases, and in order to do that we must have experts who devote their whole time to these studies. We have very few in the United States, and there are not enough to provide one for every five experiment stations; hence the importance of having one or more stations for attending practically to the business. It is necessary that we should know how to counteract these evils, just as Professor Riley has been teaching our country how to study noxious insects in all their various stages, to know at what stage of development it is most important to destroy them.

A good mycologist, who at the same time is a prominent fruit-grower in the West, well observes that the life history of many of the fungi is exceedingly complicated, and the connection between the different forms that the same species assumes at different stages of its development has only been completely made out in a few limited groups; yet we cannot hope to clearly understand their action nor successfully combat their attacks till this difficult task is accomplished for all our injurious species. The importance of this subject to our agricultural and horticultural interests cannot be overestimated, but from the nature of the difficulties to be surmounted, it will proceed very slowly in the future, as in the past, if left to the unaided exertions of private students. I would urge most strongly the importance of some provision for the systematic study of the fungi and their relations to our agricultural and horticultural interests. If the measure for establishing experiment stations in the different States should become a law, then this subject could receive the attention due to its importance by employing a competent person at each station, to collect material and make experiments, under the direction of a central office connected with the Department of Agriculture, if you please, that should be provided with a complete library and all the apparatus necessary for the most thorough investigations.

Now, I will state that circumstances have compelled me to give some attention myself to this study, and it has resulted in the discovery of a few of these fungi, and their damaging effects on our domestic animals, so that by pointing them out to a few of our farmers, several of them have saved annually, during the last few years, from $5,000 to $10,000 a year in the diminished loss of their live stock. I could go on to give you illustrations till the hour of adjournment, but I won't trespass upon the patience of the convention.

Mr. ALVORD. In the name of the committee I ask that the subject be laid upon the table until Dr. Dabney has presented his resolution.

There was no objection.

Mr. DABNEY. I have a resolution connecting itself naturally to the one just presented to your body providing for additional work in the botanical division of the Department of Agriculture, to which I beg your attention for a very few moments. On yesterday I presented a resolution setting forth my belief, and that of a few others of us, that the ordinary distribution of common, untested seeds was not contemplated by the law, and was useless and injurious. It is unnecessary to say that in framing this resolution I have now to offer no modification of those views with regard to the uselessness of distributing common seeds in the way in which they are distributed, through Congressmen, throughout the country. However, I am always ready to travel as far in the direction—I think in the right direction—as possible, even if I cannot travel the whole way, to my end, and I hope earnestly that this resolution will find the approval of this body. I offer the following amendment to the paper, or resolution, of Dr. Phares providing more work in the botanical division of the Department of Agriculture:

*Resolved*, That the Commissioner of Agriculture be respectfully requested to take into consideration the matter of providing expert work in connection with the botanical division of the Department for testing of seeds to be sent out by him, both as to vitality and purity.

I have very little to say on this subject, for enough has been said already. We have heard from Professor Knapp some instances where injurious or useless seeds—seeds carrying weeds and insects—have been scattered through the country. Professor Dwinnelle has told us of infected plants and seed, introduced into California by this Department, and other gentlemen have spoken to the same effect, both in public and private, during the course of this meeting.

Mr. PHARES. Let me suggest one word there; these very seed I have sometimes found have brought in these fungi also.

Mr. DABNEY. Yes, sir, that I understand; and for that reason I want to consolidate my proposition in some way with your resolution. I hold in my hand a letter addressed to me by a botanical expert, which contains some facts so impressive that I beg leave to read them.

The gentleman writes:

> You know that we have at the Department of Agriculture a seed division that distributes seeds all over the country. So far as I can find out, none of these seeds are examined in any way, either for testing their purity or vitality, and it sometimes happens seeds distributed under a given name prove to be something entirely different, and, worse yet, something perhaps most undesirable. I opened a package of seed from the Department ticketed sweet vernal grass. There was one seed of Anthox anthum in the lot; the remainder of the sample was sheep's fescue, liberally supplied with the seeds of weeds, as medicago, luphlina, spurgularia, &c. Had this fallen into other hands we would have seen an unpleasant criticism in some agricultural paper reflecting discredit upon the Department, and upon the botanist in particular.

Let me add here that I have often heard such complaints. It is supposed that the botanist of the Department of Agriculture is responsible for all such errors as this sending out of seeds containing weeds, &c., when the fact is that the botanist has no chance at the majority of seeds which are sent out. And frequently these disagreeable criticisms are aimed at innocent persons. The majority of these seeds go out with the simple words "Department of Agriculture" on them, and as there are a great many State departments of agriculture, people remote from this Department, and entirely innocent of any connection with the subject, have frequently been very much abused for the result when the seed did not come up or when they came up a crop of weeds. We have at the North Carolina department of agriculture received the pleasant credit of having sent out such seed, which, on investigation, were shown to have come from the national Department.

The letter goes on to say:

> Now the botanist has nothing whatever to do with the seed division. He doesn't know what comes in nor what goes out. In view of the fact that the Department widely distributes such vast quantities of seeds of all kind, it has the means of doing a great deal of good or a great deal of harm, according as the seeds are good and of high standard of purity or the reverse. Another thing sometimes happens: Seeds of certain varieties are sent to sections of the country where they can, from their very nature, be of no earthly use, a fact which any one possessing the least botanical knowledge of the geographical distribution of plants could have foretold at once. The result of all this is, we frequently see reports that the seeds sent out fail to germinate, or that time and labor have been spent upon plants that cannot by any possibility reach a state of usefulness, or, worse than all, we learn of the introduction of a multitude of weeds that will require the labor of years to exterminate. The public is apt to place all the blame that may arise from this ultimately upon the botanist; and now, instead of allowing the botanist to disclaim all connection with the matter, I think the responsibility should rest with him. It is not to be supposed that any one possesses a greater knowledge of the plants represented or is more able to detect impurities. In order to protect himself, he should require that samples of all seeds for distribution should first be submitted to him for inspection, and should they not reach a given standard of vitality and purity, he should have power to condemn the lot as unfit for distribution.
>
> If some measure can be effected by which the above proposition—that of the submission of the seeds to botanical inspection and tests—may be put into force, the Department will have made a long stride towards greater usefulness, and will surely command greater attention and respect from the community at large.
>
> By what I have said above I don't in any wise wish to reflect discredit upon the seed division as it now stands, nor upon its present management; my purpose is to point out a way to secure the confidence of the people in its good work and render its usefulness less subject to criticism.
>
> I have presented this matter to you, not but that you may have already considered it, but to show you my views on the subject and to suggest one means of accomplishing a desired end.

And further, I have only to add that we believe that public opinion is progressing in this matter with great rapidity. It has been agitated a good deal in the last few years, and is now receiving considerable attention, not only from scientific experts, but from farmers, and the time is, I believe, near at hand when the motive of expediency, which alone has maintained this absurd business, will no longer be the prevailing motive; when, instead of having our Commissioner in the position with regard to this matter described by himself the other night, viz., that of the helpless bull in front of the Congressional railway train, we, as the train made up of an enlightened public and of scientific men behind him, will make him the locomotive, and our locomotive will knock the Congressional bull off the track.

The **President**. If the convention will bear with me a moment, I would like to state that one of the first matters to which I gave attention when I came into the Department was this question of the diseases of plants—the smuts and rusts and mildews and molds, &c., which affect plants. After a conference with my chief of division I selected a man whom we suppose and believe is especially qualified to investigate that subject, and from whom I expect to receive valuable reports. I not only went so far as that, but I have also given directions to procure all of the best publications on the subject now known in Europe; in short, I am pursuing the very course which you are recommending.

One other matter: I have been particular likewise, and shall be particular, in securing my seeds, and as far as it is practicable I shall purchase these seeds from the original growers; for, whatever may be the demands or the conditions to which I am obliged to conform, nothing need prevent the closest attention to the purchase of seeds that are fresh and pure. [Applause.] I confess that I should like to be a little more free and unrestrained than I shall be, but I shall use the best judgment I have, in executing the law, which manifestly calls for quantity as well as quality. Again, I am inclined to fear that if I should invest our money in very high-priced articles and obtain but a few seeds, that adverse criticism would result. I am confident that the time will come, and I hope speedily, when a marked change will obtain in the character of the seeds sent out from this Department, and may I hope also in the character of the parties that are to plant and test them.

I want to say also that I have endeavored to select a man to have charge of the distribution of these seeds who has made, to my personal knowledge, the subject of their adaptation to different sections of the country a specialty. He is careful and cautious, and will undoubtedly meet the requirements of his office, and will not be apt to send out any spurious or impure seeds or those containing seeds of noxious weeds. Of course when there is so large a distribution it is possible that now and then some mistake will be made, but I can assure this convention that, so far as I am able, I shall endeavor to have no proper complaints made against the Department on account of the distribution of diseased plants or noxious weeds or foul seeds. As I say, I may make some mistakes. We are all liable to that failing; but I do claimto know what the farmers of this country want, and so far as I am able that want shall be satisfied. I am glad that this matter has been brought up, because it has given me an opportunity to make this statement.

Mr. **Vasey**. As botanist of the Department, I wish to say that I approve very cordially of the resolutions that have been presented, especially that in reference to the investigations of plants—the fungoid diseases of plants—and the investigation of injurious, hurtful, and poisonous plants, as well as the distribution of seed. They are all matters appropriate to the botanical division of the Department; but they require, in order that the investigations may be properly and thoroughly carried out, that the force of this division be enlarged. That has been called for in the resolution, and if it results in an enlargement of the force it will give me great gratification to give attention to the matter referred to.

Mr. CURTIS, of Texas. There is just one point in that resolution which I would like to have changed; it is in the first part. I would like to have it read somewhat like this: That the Commissioner having found it necessary to use greater care in the examination of seed about to be distributed, we recommend that this legislative committee memorialize Congress asking for an appropriation for the purpose. I do not exactly like the wording of the resolution, which to me, although I know it is not intended that way, reads as if the present Commissioner would not take these steps unless we urged it upon him by these resolutions.

Mr. RILEY. I should very much like to see the two resolutions kept apart, so that we can have a vote on the first, which I think is quite distinct from the second. The question as to organizing on some basis a mycological inquiry, that is to say, some thorough investigation into the fungous diseases of plants, is very important and one which I have long felt should receive some attention from the Department. In fact, some two years ago, a number of prominent merchants and fruit-growers of Michigan memorialized the then Commissioner of Agriculture to institute some such investigation into the rots of fruit. The rots of different fruits cause an immense amount of damage, if you take the whole country into consideration, and the study of their cause and cure is a very important one, as all discussion in horticultural bodies very well attests. The letter was submitted to me and I drew up a plan, merely as recommendatory for the Commissioner to consider. I only know that no consideration was given to it, that came to any practical result. This proposition is important, and whether or not the methods proposed are the best is perhaps not for me to say. I will suggest, however, that all mycological investigations should be in the botanical division and under the supervision of the botanist. Fungoid means fungus-like, and as this is not what is intended, the term should be changed to fungus where used in the resolution. I would suggest that the distinctive character of the investigation be mentioned in the earlier part of the resolution, so that there will be no conflict between the mycological and entomological investigations. Diseases that are due to micro-organisms are in many cases closely allied to diseases produced by insects. For that reason fungous diseases are very often sent to the entomological division, and *vice versa* diseases produced by insects are sent to the botanical division, as Dr. Vasey knows. Now I believe that the entomological portion of the investigation should not be mixed up with the other. I think as the resolution stands it indicates simply diseases, and that may include a great many products by insects which I do not think it was intended to include.

Mr. ALVORD. On behalf of the committee, I desire to state that it was their wish that these gentlemen should have this opportunity of presenting in their own language these resolutions, but the committee upon considering both, felt that each related to the detail of the Department whose present administration is just beginning, and that the form of both resolutions, as a matter of courtesy, if from no other consideration, had better be changed so as to take the shape of a desire on the part of this convention to strengthen the hands of the Commissioner in the effort he is now making; and therefore, on behalf of the committee, I make this motion: That the resolutions offered by Dr. Phares be now laid upon the table, and that the following be substituted for both the resolutions last offered to the convention:

*Resolved*, That, in the judgment of the convention, it is desirable that Congress should provide for the Department of Agriculture increased facilities for the botanical division, and require thereof an expert examination of all plants and seeds in possession of the Department before their distribution, with a view to securing identification, purity, and vitality, and the prevention of the injurious results of an unguarded distribution; and further, to provide for investigating the causes, extent, and remedy for the fungous diseases of plants.

I move, sir, the adoption of this resolution.

Mr. DABNEY. As far as I am concerned, I withdraw my resolution and second the resolution of the committee.

Mr. TAYLOR. I move that the paper be laid upon the table.

The PRESIDENT. If it lays on the table, that will end all discussion upon it.

Mr. TAYLOR. Then I move to amend, that instead of the botanical division having an increased force, for the study of fungous diseases, that the microscopical division have an increased force for that purpose.

The PRESIDENT. That is not germane to the question. It is a separate and independent resolution and must first be considered by the committee on resolutions.

The substitute of the committee was then adopted.

Mr. ALVORD. The next request of the committee is, that Dr. Egleston be given the floor.

Mr. EGLESTON. I suppose, Mr. President, that as the subject of forestry has come latest before us for attention in the community at large, it is fitting that that subject should come last for consideration here. I have enough to say to occupy a whole session of this body; and I suppose it is the province of every specialist to consider his own department of work as the most interesting to the whole world and exceeding every other interest. For fear that, in my endeavor to bring before you the subject which I have in hand, I should trespass upon your time, I have reduced to writing a few thoughts that I should like to bring before the body as the basis of some resolutions which I trust will pass, without dissent:

## FOREST EXPERIMENT STATIONS IN CONNECTION WITH AGRICULTURAL COLLEGES.

With the general facts and principles relating to the subject of forestry every one here, of course, is familiar, and there is no occasion to occupy the valuable time of this convention with the mention of them. It may not be out of place, however, to advert to a few facts of a more particular character, with which some may not be so conversant, and which are the proper basis alike of the popular and the scientific consideration of the subject.

The last census reports the destruction by fire of 10,274,089 acres of our forests during the census year 1880, laying bare an area equal to that of the States of Massachusetts and New Hampshire combined. From the reports gathered by the forestry division it seems probable that the ravages of forest fires during the present year will not be less in extent than they were in the census year referred to.

From the best sources of information we have it may fairly be concluded that to furnish ties with which to keep in repair the existing railroads of the country, and to construct the average annual amount of new road will take the available timber from 584,564 acres.

From the reports made by the lumber exchanges, boards of trade, and other sources of information, it appears that the amount of sawed lumber prepared for market, which in the census year was 18,000,000,000 feet, will be this year 28,000,000,000, or the product of 5,600,000 acres, an increase, it will be noticed, of more than 50 per cent. in five years.

To supply our dwellings, stores, factories, steamboats, and locomotives with fuel will require the product of 6,560,000 acres.

All other wood products of a miscellaneous character, such as hewn timber, telegraph poles, posts, and those of which we have no definite reports, will consume the trees growing on 4,260,000 acres, making in all 27,278,653 acres of woodland which we may reasonably suppose will be laid bare by the ax and by fire during the present year. In other words, our forests are being swept away at the rate of 74,736 acres for every passing day. If this destruction were concentrated upon one spot, say the State of Rhode Island, and it were completely wooded, every tree would be cleared away in about eleven days. At the same rate either of the great States of Ohio, Indiana, or Louisiana would be cleared in less than one year.

Such statements enable us to realize, to some extent, at what an alarming rate the destruction of our forests is going on. Already it has become difficult to obtain first-class timber of the best quality, and though portions of the country seem still to be well supplied with wood, the appearance of our forests is deceptive. On examination they are not what they seem to be to the casual observer. The substance is not there.

This consumption of our forests is more than we can afford, especially when we consider that three-fifths of it, that occasioned by fire, is an utter loss, without any necessity, and without any incidental benefit to mitigate the disaster. It is not only a complete present loss of material, but in many cases of forest fires the soil itself is so far consumed or deprived of plant food as to preclude the possibility of any valuable growth on the same spot for many years to come; while the open spaces thus created and the mountain declivities made bare often become the sources of disastrous floods and droughts, thereby entailing additional losses, it may be, for a long period of time.

But this is only one illustration of the spendthrift way in which as a people we have been living. No nation ever had such a natural heritage as we. No nation ever wasted its heritage more wantonly than we have wasted ours. We have felled and burned our magnificent forests and cleared them away to make room for agriculture, and even beyond the demands of agriculture, and then, after thus taking away the outer garment with which the land was beneficiently clothed, we have skinned the land itself by our wasteful system, or no system, of tillage. Year by year the flames of countless strawstacks on our Western prairies and elsewhere have attested our folly in thus consuming the elements of fertility in the soil and thereby wasting our capital. But so we have gone on until now at last, with the spendthrift's usual experience, we have come to the point where we see that this course cannot be pursued longer without threatening most disastrous results. The spendthrift must now work or starve. It is clear also that he must work in a systematic manner and in accordance with the natural laws of the world in which he lives.

This we have been sensible of for some time, so far as agriculture, in the ordinary sense of that term, is concerned. Hence the establishment of the agricultural colleges represented here to-day, designed to foster a truly scientific agriculture, and thereby lighten the labor and increase the products of the husbandman.

The same necessity requires the adoption of a scientific system of forestry. The almost total lack of tree-growth in some parts of the country, which are most desirable for agricultural purposes and rapidly filling up with settlers, has led to a popular agitation of the subject of forestry within the last few years which is quite noticeable and promising of good results. Trees, in considerable numbers, have been planted, and the work has been encouraged by the Government through its timber-culture act and otherwise. But this planting, while beneficial in some measure as partially meeting the immediate exigencies of the case, has been very inadequate in amount and haphazard and unscientific in character, at best hardly more than a temporary makeshift. Often trees of poor quality, and such as could be procured with least trouble and expense, have been planted and inadequately cared for afterwards. This has been partly because of the uncertainty whether better trees would flourish in the particular localities and partly from other causes.

And so the great, permanent, and satisfactory work remains to be done. We must not only be conservative in the use of our remaining forests, but we must plant trees on such a scale and with such care as we have never attempted before. Only by so doing shall we escape injuries and disasters from which many countries of the Old World have been suffering for a long time. As neither the individual farmer nor the country at large can afford to depend longer upon the old methods of agriculture, neither can they upon the old methods of forest-supply. The land has become too valuable and the competitions of life too ardent to admit of it.

Now, too, we have found that a proper system of agriculture involves a proper system of forestry. The great meteorological agencies upon which successful agriculture depends are affected and modified by the presence or absence of masses of trees and their position in reference to the atmospheric currents and the sources of water supply. Where there are masses of forest answering these conditions and still in the possession of the Government or of the particular States, every consideration demands that a sufficient portion of them shall be maintained in the forest condition, and the timber removed from time to time only when it has ripened and attained its greatest value, and the removal to be so managed as not to impair the character of the forest as such, or endanger its perpetuity.

But in many portions of the country there are no such public forests, and it is impossible, probably, to place any restrictions upon the consumption of forests belonging to private owners. Earnest and repeated endeavors have been made in great conventions of the owners of the rapidly diminishing pine forests of the Northwest to come to some agreement among themselves on the simple basis of self-interest by which the cut of trees should be restricted within certain limits, by which means the glut in the lumber market would be relieved, the price of lumber increased, and the duration of the forests as a source of revenue to their owners prolonged. But no such combination has been found possible. Individual will and individual greed refuse restraint, and they will have their way until the last pine falls before the ax of the lumberman.

I do not forget that there is a process of natural reproduction going on, to some extent, in various parts of the country, especially in the older States. But this by no means equals the consumption which is all the while taking place. There is a steady decline in the forest area of almost every State. And where natural reproduction is suffered to go on the forests thus secured are of comparatively poor quality, composed to a great extent of trees of inferior character and growing in such a manner as to furnish but an inadequate product in proportion to the area of ground which they occupy. They need to be brought under the hand of scientific forestry and to undergo a process of *regeneration*, as it is called, that is, a process of reconstruction which involves their replanting to a considerable extent, the replacing of trees of inferior quality by those which are more valuable, and such a system of culture and management as will secure their speediest and best growth for the purposes to which they are to be devoted. If he is a benefactor and a minister to the general welfare who causes two blades of grass to grow where only one grew before, he also may be considered such who causes two trees to lift themselves up in the forest where previously the ground sustained but one. And this may be done all over the land, adding millions annually to the arts, the industries, and the comforts of life.

But there remains a large portion of the country destitute, or nearly so, of any natural tree-growth, where the extensive planting of trees is an imperative necessity; and it is here, pre-eminently, that the aid of science is needed and its greatest benefits are to be secured. The present or prospective settler in the treeless portions of the country does not know what trees are best adapted to his soil and to the meteorologic conditions in which he is placed. He does not know the best modes of culture for different trees in the various conditions to which they may be exposed. He does not know which will grow well for a time and then fail and thus disappoint his expectations. Time and experience only can settle this, and he can afford neither the time nor the ground for testing the matter by the requisite experiments. Many of the most desirable experiments he could not make either if he would. They can be made only under some arrangement by which, without regard to time or expense, all matters relating to tree-growth, from the gathering, preservation, and sowing of the seed, the preparation of the soil and the cultivation of the tree from its first sprouting to its ripening for use, shall be investigated in the most painstaking and truly scientific manner.

One of the most pressing needs of the country at the present time is the establishment of places where such experiments may be undertaken and carried forward, and the important practical question now confronts us, where and how can this be done?

The practicability of having such an experiment station here at the capital, under the direction of the Department of Agriculture, has been considered and urged at various times. Such a station doubtless would accomplish much good, but it would not, could not, fully meet the demands of the case. An experiment station here could solve but imperfectly the problems pressing for solution in different and distant parts of the country. The moment attention is given to the subject it is seen that separate stations would be needed at least for the Northern and New England region, for the remote Northwest, for the Valley of the Mississippi, for the arid region farther west, for the Gulf coast, and for the Pacific Slope. In fact, when we begin thus to consider our vast territory, with its widely differing climates and meteorologic conditions, we can hardly fail to see that there is sufficient warrant for the establishment of an experiment station in almost if not quite every one of our States—empires as most of them are, in extent. Germany, little larger territorially than our two States, Colorado and Oregon, has nine schools for instruction in forestry, each one furnished with a company of instructors equal to that of many of our colleges. Germany finds it for her interest to maintain these schools, and to cultivate her forests under a scientific management, such as is taught in them. Thus cultivated, they become not only the most efficient aids to agriculture and to various industrial arts, but one of the most important and trustworthy sources of revenue, showing that science is the promoter of true economy. The experience of most European countries corresponds in this respect with that of Germany. The Almanac de Gotha for the present year gives the following figures from the annual budgets of some of the countries of Europe:

Prussia expended for the care of new forests last year 30,611,000 marks, and her receipts from the same were 52,333,000.

In Alsace-Lorraine the expenditures on the forests were 2,816,325 marks, and the receipts from forest products 5,571,000.

In France the expenditures were 17,983,608 francs, and the receipts 35,640,934.

In Sweden the expenditures were 694,000 krona, and the receipts 1,400,000.

In Denmark the outlay was 366,458 crowns, and the income 1,144,714.

Looking over the whole field, therefore, and inquiring how best and most economically the work needed in the interests of forestry can be done, it would seem to be the most natural and feasible course to establish experiment stations in connection with our agricultural colleges. In no other way, it would seem also, can these colleges more appropriately fulfill the object for which they have received their large endowment from the General Government. In no other way can they better subserve the general interests of agriculture and the mechanic arts, and thus the general interests of the country. Already they are equipped in good measure for the needed work. In most cases they have the requisite faculty of teachers and sufficient scientific apparatus at least to begin the work. And if a course of instruction and experiment were to be undertaken by them, under the direction of or in harmony with the department here, all working upon common lines of investigation and with similar methods, regular reports being made to the head office here and the comparative results thence made known to the whole country at frequent intervals, it can hardly be doubted that the Government would be ready, as occasion should arise, to make liberal appropriations for carrying on the work and meeting any expenses incident to its fullest development. The individual States would see also in a short time the value of these experiment stations and be ready to encourage them. These stations would be the effective means of diffusing in the several States a knowledge of the value of their indigenous trees for both economic and ornamental purposes. They would be the means of introducing and distributing valuable trees from other countries or from other parts of our own country. They would create and diffuse throughout the country what may be called a tree sentiment than which none would be more wholesome or productive of good results. It would be conservative of the existing forests and encourage the planting of new ones. It would favor the growth of the best trees. It would protect our streams and insure a sufficient and steady water supply for our fields and factories. It would subserve agriculture, health, and comfort. It would insure for us an adequate and perpetual supply of fuel and lumber for all the domestic and mechanical uses of life. It would plant trees along our road-sides, around our dwellings, and in public parks and grounds. It would cultivate a love of the beautiful everywhere and go far to make many a place now repulsive as a desert almost another Eden.

Now, sir, I move the adoption of the following resolutions:

Whereas nothing is better established than that a proper extent of forests is essential to the comfort and prosperity of nations, and history shows that nations have declined in prosperity, in power, and in population, through the wasting of their woodlands; and

Whereas a due supply of forests is the best guarantee of successful agriculture, by guarding the crops from injurious winds, by causing and maintaining an equable state of moisture in the atmosphere and securing a regular flow of rivers, as well as by other influences: Therefore,

*Resolved*, That this convention views with apprehension the rapid and indiscriminate destruction of our forests by fire and by the ax of the lumberman, and deems it the duty of the National and State governments to suspend the further sale of their wooded lands until a careful examination shall show what portion, if any, may be disposed of with due regard to the permanent welfare of the country; and that in respect to those portions to be permanently reserved such a policy should be pursued as will guard them from depredation, secure the best and most abundant tree-growth upon them, and the marketing of the trees only when ripened, or in the best condition to subserve the arts and industries of the country, and thereby produce the largest revenue.

*Resolved*, That this convention urges the adoption by the National and State governments of more effective measures for the prevention and suppression of forest fires, which are entirely avoidable, yet are consuming annually property valued at not less than $500,000,000.

*Resolved*, That in view of the rapid wasting of our forests, and the need of improving by proper care and culture the character of those that remain, as well as the indispensable necessity of planting trees in regions now destitute of them, a system of instruction in forestry, coupled with scientific experimentation on the subject, should be established (if it has not been already) in all our agricultural colleges; that it should be carried on in co-operation with, if not under the special direction of, the Agricultural Department, and that to render it most complete and efficient all needed aid from Congress and the several States may well be invoked.

Mr. DWINELLE. I second the motion to adopt the resolutions.

Mr. GLENN. There is one of those resolutions which I am not now prepared to favor. The resolution speaks of the forest fires. I think it is too late to discuss so broad a question, and I do not propose to go into a general discussion of it. I merely want to state the reason why I cannot favor that resolution. I think our timber would be greatly improved if we burned over our forests every year when there are a few leaves on the ground, provided those leaves cannot be raked off and composted. I believe it to be an improvement to burn them, and I state it after having made a great many experiments. We all know of the diseases that are produced in our forests from insects and other unfriendly influences, and I believe that fire will reduce them. I think that these fires would greatly injure the trees, but we know where woods have been burned over that the larger forests have not been injured at all, that is, to any great extent. It has been claimed that these fires will injure the soil. To that subject my attention was called accidentally, and I found that the fire did not injure the soil, but, on the contrary, it very greatly benefited it. But the hour is late and we cannot go into this discussion now. I simply rose to say that I do not feel willing to vote on the subject now.

Several delegates rose.

The PRESIDENT. I would suggest, gentlemen, that it is very late and that we make our remarks very brief indeed. If you will permit me I will suggest, also, that I think the resolutions cover a good deal of territory. What we are seeking now are results, and I am not clear that it would be proper at this time to debate this question. I leave the matter entirely with you and merely make the suggestion.

Mr. FAIRCHILD. I would like to suggest to and ask kindly of Dr. Egleston to withdraw this resolution before the assembly, for this reason. We have come together with certain specific purposes to accomplish, and if we put too many resolutions into our business we shall load down those which we desire to carry through. We are all in accord with the suggestion which the doctor has made, but the measures which we propose and which we wish to carry through will almost assuredly bring further experiments in this very line. It seems to me that we shall do better as an assembly of this kind without the resolutions than with them, showing our spirit in the tone with which we have received the doctor's suggestion.

Mr. EGLESTON. Mr. President, I have no objection in complying.

The resolutions are withdrawn. But when the Commissioner called his heads of divisions together and told us that this convention was to be held and expressed the wish that we would conspire for its success and offer any considerations which might occur to us before it, I hailed it as an opportune time for saying something in behalf of what I consider, as an expert, the great and pressing interest of the country. I should be very sorry to present them and have them rejected, and I would much rather withdraw them.

Mr. ATHERTON. I may preface what I am about to say, Mr. President, with the suggestion that in your absence the convention, in order to perpetuate its organization, appointed an advisory committee of one from each State and Territory to co-operate with yourself in calling the next convention, and in preparing for that convention a programme for papers and discussion. The convention was also kind enough, in that connection, to place upon me the not very easy duty of selecting five to act in connection with myself as an executive committee to co-operate in this work, and I have named the following: Mr. Cook, Mr. Knapp, Mr. Peabody, Mr. Curtis, and Mr. Newman.

The PRESIDENT. If there is no objection the committee as reported will stand as approved.

Mr. ALVORD. The committee on order of business has but a closing resolution to offer, and we are ready to present it whenever the convention indicates that it is about to dissolve.

Mr. GLENN. I had drawn up some resolutions, but the idea contained in my first resolution is embraced by a similar one formulated by the committee, and I will therefore not read that, but the second resolution I would ask the committee to permit me to offer.

*Resolved*, That the thanks of this convention are hereby tendered to the Baltimore and Ohio Railroad for special rates offered to members of this body.

The resolution passed unanimously.

Mr. ATHERTON. There is just one very simple matter, about which I should like to ask a single question in behalf of the executive committee and the advisory committee also, and that is as to the time of the next meeting of this body, whether it would not be desirable to indicate in general the time of the year; for instance, some have suggested the summer vacation when all are free, others have suggested the Christmas holiday vacation, still others have suggested the spring vacation, which comes rather irregularly. My own judgment would be, from hearing a great many suggestions, that if the body could be called together early in January it would be well. I have no desire to influence the matter, but I make the suggestion.

Mr. CURTIS, of Texas. I would like to suggest in connection with that that January would be rather a bad time for us in the South, as you have decidedly cold weather up this way at that time, and if this should be selected as the place for meeting that would be a very bad time for it. I myself would be very averse to coming at that season.

Mr. FAIRCHILD. I would suggest that most of the legistures of our States convene about the first week in January, and those of us who are familiar with the proceedings of those bodies know that it is necessary to be somewhere near them about the time when they organize.

The PRESIDENT. My impression—I may be mistaken, of course, in it—is that you will get a larger and better attendance during the summer vacation, about the time that you have met this year. If you can only get a little cooler weather than we have had this week—and we have had cool weather until this time—my impression is that you will have a more general attendance after the commencement exercises in June than at any other time. I do not, of course, know how that may be.

Mr. LEE. I move now that Major Alvord present that resolution.

Mr. ALVORD. Mr. President, the committee ask the privilege of presenting the following resolution:

*Resolved,* That the Commissioner of Agriculture be respectfully requested to publish and distribute the proceedings of this convention as speedily as the duties of his Department will permit.

The resolution was agreed to.

Mr. ALVORD. The committee ask the adoption of the following resolution:

*Resolved,* That the thanks of this convention are hereby cordially tendered to the honorable Commissioner of Agriculture for the thoughtful interest in the advancement of scientific education and investigation which led him to call the convention; for the address in which he outlined its work; and for the constant courtesy and assistance with which he has promoted its proceedings.

Mr. FAIRCHILD (the secretary). Gentlemen, you have heard the resolution. The question is upon its adoption.

Mr. ATHERTON. I want to say that I have attended a great many conventions of a great many kinds, but I have never attended one which seems to have been composed of more earnest men, or to have accomplished more substantially the results which we aimed at; and I cannot but feel that very much is due to the thoughtful consideration bestowed upon it by the Commissioner of Agriculture, and I most heartily second the resolution.

The resolution was unanimously adopted.

The PRESIDENT. [Greeted with applause.] Gentlemen of the convention, I have not words to express to you the thanks which I feel for this kind recognition of my services in calling this convention. I felt in doing so that I had assumed a very grave responsibility, and I can assure you that I have been very anxious as to the results of this convention. They have been entirely satisfactory to me, however; indeed far more has been accomplished than I had expected. I have in my time presided over many conventions, but, gentlemen, in all my experience I have never presided over a convention where such unanimity, where such ability, where such an earnest effort has been made, by all its members, to carry out the great objects for which it was assembled. I wish to say in this connection, as I believe the convention has been a very satisfactory one, and as we have commenced as I hope a new era in the working of this Department, that I ask of you, although I know I need not do it, that this work be continued, earnestly and in good faith, from this time forward until the objects of this convention shall be most fully realized. [Applause.]

I want to say further that although I have no funds specially authorized for establishing a bureau of information and correspondence, yet if you will furnish me with reports of any of the experiments which you are conducting at your respective colleges and experimental farms I will see that they are properly collated, and, in some suitable form, published and sent broadcast to every college and experimental farm in the country. I am using every means in my power to begin this initiatory work, for I see that it is fraught with grand results, and I ask, therefore, for your support in this direction. I can do nothing without your aid, and as we have commenced, as I think, auspiciously, let it not end as some of the other conventions of this Department have ended; let us see that the results are carried out, are realized, and every one of you gentlemen can aid and assist in its accomplishment. I hope that hereafter we may meet together yearly, because I believe that by such consultation, by communicating with one another, by telling our experiences, our successes, and our failures, great good can be accomplished. I think that no gentleman has come here who has not realized the full worth of the time and money which he has expended, and that as you return to your homes, and your colleges, the students who attend them will receive in benefits tenfold the cost of your coming. I again thank you for the kind and generous treatment which you have accorded to me, during the sitting of this convention, and now, wishing you all a safe and happy return to your homes and families, I declare the convention adjourned *sine die*. [Applause.]

And so, at 10 o'clock and 30 minutes, the convention adjourned.

# APPENDIX.

[The following papers have been submitted to the committee on printing, and are made a part of this report.]

## THE LIMITS OF EDUCATION, UNDER THE LAW, AT OUR AGRICULTURAL COLLEGES.

By Prof. S. A. Knapp, LL. D.

The impression seems to be quite general that our agricultural and mechanical colleges have drifted from the original design of their founders, and are doing a work diverging but little from that done by the leading colleges and universities of the land and for which there is ample provision without the expenditure of this special fund and force. It is charged that most of the revenues derived from the lands donated by Congress to the several States for the purpose of endowing colleges for the benefit of agriculture and the mechanic arts has been absorbed in general education to the exclusion of the main purpose. In view of this charge it may be well to survey the field of labor assigned to these colleges and at least satisfy ourselves that we have made an intelligent interpretation and application of the law. The act of Congress creating the endowment of our State industrial colleges was passed July 2, 1862, and is entitled "An act granting public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts." The fair and natural construction to be placed upon this language is that the benefits to be conferred are educational, and that they must be limited to agriculture and the mechanic arts. This limit requires that the knowledge imparted relate directly to these industries, and, secondly, that it be in such a practical form as to be immediately usable in the direction indicated. It further requires that the persons instructed be now engaged in agriculture and the mechanic arts, or that their education shall directly aid in the promotion of these industries.

This construction of the law precludes using the funds derived from the grant for the purposes of general education solely, and it regards the education of young people for the professions, or for other industries than those specified, as contrary to its intent and in defiance of its spirit. The construction sometimes placed upon the law, that it was the intention to educate the children of the industrial classes for "the various pursuits and professions of life," is open to the fatal objections, first, that it nowhere intimates that the grant is for the children of the industrial classes, but it expressly states that it is for the industrial classes themselves, *in* the various pursuits and professions of life, not *for* them, which, with the widest range of interpretation, still limits the education to the industrial pursuits and professions; second, the granting of lands for the education of the children of one class of citizens to the exclusion of another would be a species of class legislation so contrary to the spirit of the Constitution of the United States that the boldest legislator would scarcely attempt it. But, recognizing that agriculture and the mechanic arts are the chief foundations upon which rest the wealth and prosperity of this nation, Congress did attempt to establish institutions of learning for their promotion. It evidently intended to do this in two ways: First, by scattering information among those who are toiling upon the farm and in the workshop; and second, by giving such a technical education to the young as will prepare them for the best work in these directions.

A further proof that this is a correct interpretation of the spirit of the law may be found in the several sections declaring the methods by which the purposes of the act shall be carried out. In section 4 it states that the leading object shall be "to teach such branches of learning as are related to agriculture and the mechanic arts in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

Here it is expressly declared to be the intention to limit the principal instruction to such branches of learning as are related to agriculture and the mechanic arts, for the purpose of giving a liberal and practical education to the industrial classes in their several pursuits and professions. Any other interpretation would place our learned law-makers in the untenable position of solemnly enacting that branches of learning relating to agriculture and the mechanic arts are best suited to prepare men for the professions of law, medicine, literature, and others included in the various professions of life.

Section 5 names the conditions upon which these grants of land can be retained by the several States. The first condition stipulates that the funds arising from the sale of these lands shall remain forever undiminished. An exception, however, is made in favor of agricultural experimentation, thereby recognizing its paramount importance. It allows the expenditure of a sum not to exceed 10 per cent. of the original grant for experimental farms. The fourth condition upon which this grant can be retained by any State reads as follows:

"*Fourth.* An annual report shall be made regarding the progress of each college, recording any improvements and experiments made, with their cost and result, and such other matters, including State industrial and economical statistics, as may be supposed useful; one copy of which shall be transmitted by mail free by each to all the other colleges which may be endowed under the provisions of this act, and also one copy to the Secretary of the Interior."

It is a narrow view of an industrial college that it shall benefit only such as come to her halls. Evidently Congress acted upon a broader theory of the work of such a college when it enacted that the special object of the college should be to educate those engaged in the industries of agriculture and the mechanic arts, when it permitted the purchase of experimental farms with a portion of the endowment funds, and when it required, as a condition of retaining the grant, that an annual report be made of improvements and experiments, with their cost and result, and State industrial and economic statistics, and such other matters as may be supposed useful to the masses.

The writings and speeches of the men who outlined and advocated the passage of this law to endow agricultural and mechanical colleges are additional evidence in favor of the correctness of the construction I have placed upon it.

Here I am met by expressions of astonishment from some that a construction they vociferously denounce as narrow should be placed upon this grant.

My reply is that I am not responsible for the law, and am only seeking to reach an honest construction of its import. Secondly, if the object stated, as limited to agriculture and the mechanic arts, be sufficient to absorb all the funds derived from the grant, is it not better that deep and thorough instruction be given in this direction than that the range of investigation be so wide as to be exceedingly superficial?

From this standpoint let us outline the work of an agricultural and mechanical college.

First. The farm should answer the purposes of museum and laboratory, and should be sufficiently large to carry on a range of work wide enough to meet all the demands for instruction in practical agriculture.

Second. To aid the industrial classes now upon the farms, and furnish them the principles necessary to solve the intricate problems of bread and butter, the whole farm should be under experiment conditions, and receive the supervision of trained eyes, and the manipulation of deft hands. The temperature, the fertility, and the mechanical conditions of soils, the cereals, the grasses, the stock, farm improvement, and farm management are domains for investigation where dark continents lie between slightly known coasts. These should be traversed and surveyed. Among the specific things the college should do in its experimental work is the testing of seeds, grasses, fruit and forestry trees, for vigor, hardiness, and climatic adaptation. The annual losses to the farmers of Iowa, resulting from insufficient knowledge upon these subjects, amount to a sum more than adequate to support an experiment station of high grade in every State in the Union. It was undoubtedly intended to make these colleges a part of a great system of agricultural investigation to be conducted in every State, of which the Commissioner of Agriculture should be the head. It was therefore made obligatory upon these colleges to report all improvements and experiments to the Department of the Interior. Had this design been fully carried out it would have saved to the General Government the expenditure of large sums for worthless seeds, and to the people untold loss and vexation. For some years we have been testing seeds for the Northwestern prairies, and when we have found a variety utterly worthless or unreliable for that section, we generally expect the whole country to be flooded from Washington with that particular variety during the next season, as if the Government stamp would make [illegible]r out better.

The Agricultural Department and the agricultural colleges, instead of working in harmony, as contemplated, were thus in actual antagonism. Has not the time come for two advance steps?

(1) Require all seeds and plants to be distributed in any State or Territory to be first tested by the agricultural college of that State or Territory.

(2) To drop the distribution of common and almost universal varieties, such as sugar beet, sorghum, blue-grass, cucumber seed, acorns, &c., and limit the distribution to new and valuable varieties of great promise.

Would it not be well for this convention to take some action upon this important subject?

One of the most serious problems that has confronted the settlers of the Upper Mississippi and the great plains is the securing of such varieties of fruit trees as will prove hardy in our trying climate. We are also close upon the timber problem. What are the colleges going to do about it? Will they remain idle or be content with talk, while the sturdy yeomanry solve it?

(3) A third object to which our agricultural and mechanical colleges should turn their attention is some fundamental instruction in the mechanic arts that relate to the farm. To improve wisely, the farmer must know something about the construction of drains, roads, bridges, and buildings; and to conduct the operations of the farm economically, he must understand the construction and repair of machinery, the mending of tools, and the shoeing of horses. If to this be added some knowledge of rural architecture and landscape gardening, symmetry, beauty, and a harmonious adaptation to the purposes designed would gradually replace the ill-conceived and unsightly structures known as farm buildings, which appear as if some enemy of nature had conceived and executed a horrid plot to everywhere disfigure her landscapes.

If education and culture are to become dominant forces in this Republic they must intrench themselves in the country and thoroughly subject it to their influences. The history of the world has shown that the civilization of a nation must be judged by, and its destiny depend upon, the average enlightenment of its rural population.

It was therefore wise to send our great agricultural and mechanical colleges into the country. Let them do the work needed to elevate country life.

(4) If any adequate reason can be assigned why a corresponding industrial training should not be given to young women, thereby fitting them to become the companions and colaborers of men in the industrial life of the country, it has not yet been

brought to my knowledge. The average citizen of the country must be a laborer and meet the question of demand and supply from the standpoint of daily toil, and the woman who shares his struggles for subsistence should understand household arts and economy. Political economists have gone widely astray in defining the basis of national wealth. They have not recognized that in life's struggle the spoon is greater than the shovel; that more is expended for bonnets than for barns; that more capital is deposited in stomachs than in national banks.

The kind and quantity of food best adapted to the wants of the system, and such as will promote and sustain the highest vigor through life, should be made a careful study. In this intense age we have built up and operated the mind at the expense of the body and to its great neglect. Strong and grand thinking requires rich, full, and regular currents of blood to the brain.

For mental training a thorough and comprehensive study of the English language comes first in importance, whether regarded from the standpoint of discipline or utility, or as commanding the main avenues of knowledge.

The whole process of thinking passes through the forms of language; hence, to him who is to be a thinker as well as a worker the acquisition of words and sentences in which to pack thought for use or transportation is of primary importance. Accurate thinking requires correct language, and for a wide range of ideas it must be comprehensive.

Our industrial colleges deal with living issues; with men who speak the languages of the nineteenth century—languages fuller, richer in thought, and more philosophical in construction than all the languages of the past. For our people we therefore substitute the discipline and information derived from a thorough knowledge of the English for the study of the classics.

It is better to have one language well than to have a smattering of many. The masses of our people cannot visit Europe, and practically have no use for but one language. Let the people's colleges dignify this by making it conspicuous in their courses of study. It is a sad comment on the hundreds of colleges in the United States that almost without exception they devote more time to dead languages than to living, and to foreign languages than to our own. Whatever may be said in favor of this for the diplomate and the professional scholar, it cannot be justified as fitting men and women for practical life on the farm.

Scientific investigation should go hand in hand with the study of English. The eyes and the ears are the great knowledge gatherers. The great need of the industrial world is trained observers. Science is simply knowing and classifying the facts in nature and art. Every educated farmer and mechanic should lay the foundations of scientific fact and philosophy broad and deep; but the kind of science the worker needs is that which is applicable to his own environments—the farm and the workshop.

Too many of our scientists are seeking after something foreign and remote, or peculiar and astonishing, and are averse to teaching the sciences of the farm. They regard all practical application as derogatory. The botany in our industrial colleges should take the direction of the trees, the shrubs, the cereals, the grasses, and the forage plants of the farm; should refer to their breeding and how to improve them; to their diseases and how to cure them. Zoology should devote special attention to the domestic animals, their breeds, history, and habits. Chemistry and physics should be pulled off their high horses, thoroughly spanked, and set to farming. The entomologist should tell us how to encourage the friends of the farm and how destroy its enemies in the insect world. In this way science will become the friend and colaborer of the world's workers.

A knowledge of the body and its requirements should be an important feature in these schools. The world is approaching the period when men must get acquainted with themselves—become their own doctors. Does it not impress you as a peculiar phase of this so-called practical education that it should be considered more important in many agricultural colleges to study veterinary medicine than human medicine, for pupils to learn to doctor the horses, the cattle, and the donkeys, than to doctor themselves?

The farmer in his segregated life has need of both.

The farmer and the mechanic should have a thorough training in the fundamental principles of business. Financial embarrassment is the ready graveyard of enterprise. The ability to acquire, retain, and manage property is largely a matter of training. In the main young people grow up without any instruction in this vitally important line of investigation. They should early know the value of money and the obligations arising from signature and indorsement and the general principles embodied in commercial law.

Our industrial colleges should, also, include a certain amount of political and legal education. The fact that we are all citizens of a great republic should never be ignored. With its privileges liberty brings its responsibilties, and among them is the obligation to understand the principles of the Government of which we are a part. Every student should acquire a good knowledge of the civil and political history of this country. He should understand the principles of municipal, township, county, State, and Federal organization; the laws relating to highways, fences, schools, taxation, and elections. This knowledge is necessary to intelligent citizenship. The college, which seeks to make practical men, should avoid the common error of regarding the study of Roman and English law of more importance to students than the code which governs their relations as citizens. Most colleges and universities have included in their courses of study sociology, or social history. Here, again, let us change the universal tendency to make all scholarship general and theoretical and let us make this line of investigation intensely practical. The building up of country society upon the basis of high intelligence and broad culture is one of the stupendous problems with which this generation has to deal. How can we keep the college boys on the farm is asked in every industrial convention.

If better highways and bridges, affording easier access to market, the post-office, and the daily paper; if more highly improved farms and better stock, rendering the results of toil more certain and remunerative; if the environments of the home, adjusted to the demands of refinement; if compact communities, organized upon the highest type; if the school and the church, reorganized to meet the wants of broader education and a higher moral nature; if all these are a part of a practical social philosophy required to elevate the country, let the colleges so instruct. At least, let the social philosophy deal with the social conditions of our own times for the betterment of our own people.

Finally, I would include moral training. A proper understanding of and regard for moral obligations underlie all enlightened society. Devoid of them that stupendous and marvelous structure known as civilization would crumble like an ice palace under a tropical sun. All human society would be filled with distrust, and all the forces of genius would be expended in aggression or defense. A college that has not provided for a sound moral training has incorporated into its polity a stupendous error, fraught with the greatest danger to the State. Here, again, I would make the instruction entirely practical, based upon natural and necessary obligations, and I would enforce the lessons by thorough laboratory practice in college morals. The young men who are to mold the future of this country should be preeminently sober, industrious, truthful, and high-minded in all things. Let "wild oats" and college "pranks" be left on the soil where they have flourished for so many years, and let these new colleges establish a high standard of self-respect and manhood.

I have thus attempted to place a practical construction upon the law endowing our agricultural and mechanical colleges, and to outline their course of instruction.

The work of our industrial colleges may, then, be outlined as follows:

1. Practical industries on the farm and in the workshop as an essential aid to the art, the knowledge, and the discipline essential to successful agriculture.

2. Practical experimentation as a means of illustration and a valuable help to the men toiling in field and shop.
3. An exact and comprehensive study of the English language.
4. A good, practical scientific training.
5. Such a knowledge of our material organism as will enable us to maintain the highest health and vigor, and thus perform the largest amount of valuable work.
6. A training that shall prepare the student to conduct his business in a thorough and skillful manner.
7. A preparation for citizenship.
8. Some knowledge of our social organization and philosophy.
9. A recognition of our moral obligations and instruction in the duties which arise from them.

To the question, Does such a course of instruction furnish the necessary discipline? I answer: The question of discipline is not well understood. Nature's method of training is by actual practice in the line of the specific development. The best discipline for the physician is to practice medicine, and for the farmer, to farm. The real problem is full of difficult conditions not found in the theoretical problem; hence, practical matters afford the severer lines of discipline if the methods be thorough and scholarly. It is claimed that this education is not broad enough. It is as broad as the necessities of a practical life, and so broad that if the work be well done it will absorb all the revenues of the best endowed industrial college in the United States, and all the time of the student. If other work be substituted it must be at the expense of the useful and the necessary.

## THE GRASSES NEEDED FOR AGRICULTURE IN THE UNITED STATES, AND THE NECESSITY FOR EXPERIMENT STATIONS.

By Dr. George Vasey.

It is hardly necessary to refer to the immense extent and importance of the grazing industries of this country, whether pursued on the large scale on ranches as a distinct business, or prosecuted by the dairyman or farmer as a necessary adjunct to the profitable cultivation of the soil. The census returns inform us that in 1880 there were some 36,000,000 head of cattle, including milch-cows, and over 46,000,000 head of sheep. These numbers have been greatly increased since that census, and are being increased every year. This immense number of animals must have their subsistence principally upon grass, either green or in the form of hay and fodder.

Our present design is to inquire into the resources of the country with reference to its grazing facilities, and to the necessity of increasing those facilities.

We know that very few plants and very few grasses have a cosmopolitan character adapting them to all climates. In the wild state we find that the grasses of one section of the country are different from those of another section. Some of the kinds are very local and others have a wide range. There are known to exist in the United States between six hundred and seven hundred species of grasses, in which there is a great variety of form, habit of growth, size, vigor, duration, quantity of foliage, time of growth, and adaptation to climatic conditions.

In our vast and sparsely settled Territories the native grasses are the ones which furnish subsistence to the millions of cattle which range over the arid plains or feed in the quiet parks and mountain meadows, or on grassy slopes and high table or bench lands.

But in the older States, where agriculture prevails, it is quite different. Here, although the native grasses have not been exterminated, they have been driven to the uncultivated woodlands, or to neglected and out of the way places. Although the settlement of the country is very recent, I am not aware of any reliable account of the particular grasses which formed the bulk of the wild forage at the time of its first discovery, but they were sufficient for the wants of the people for a long time.

In the Northern States the severity of the climate made it necessary to provide hay for the use of stock during the long winters. The natural meadows and marshes furnished the supply for this hay until by the progress of settlement the farms began to crowd one another and the range for cattle became restricted.

Then arose the question of forming meadows and pastures of limited extent, and inquiry as to suitable kinds of grasses to be employed. In the early part of the last century one of the most prominent men of New England was Jared Eliot, a grandson of the noted John Eliot, the apostle to the Indians. He was an able preacher, a skillful physician, and a scientific and practical agriculturist. He states that a Mr. Timothy Herd found a grass growing in a swamp, or probably a low meadow, in New Hampshire, which grass he cultivated with great success, and that others cultivated it under the name of herds grass. Its cultivation is said to have been introduced in Maryland about the year 1720 by a Mr. Timothy Hanson, and from him its cultivation spread as timothy grass. This was some forty years before its cultivation in England. It has been commonly stated by botanists that timothy (*Phleum pratense*) was introduced into this country from Europe, but this statement has not, it is believed, been corroborated by any testimony, but is a conclusion drawn from the fact that it is found wild in many parts of Europe, while it is said to be found wild in this country only in localities where there is a probability of its having been introduced. It appears that this is a prejudiced argument, for it is found extensively, without cultivation, in Alaska, Labrador, and the Rocky Mountains, and there is quite as much probability that the specimens found in New Hampshire by Mr. Herd were native specimens as that they had some way been introduced from the Old World. Mr. Charles Pickering, in his Chronological History of Plants, states that this grass, *Phleum pratense*, was observed by himself in wild situations in New England, often within the margin of the forest. It is not likely that this question can at this period of time be definitely determined, every man being at liberty to form an opinion for himself. But, however the question of its nativity may be settled, the thanks of this country are due to Mr. Herd for the introduction to agriculture of one of the most valuable grasses in cultivation. It is, however, generally admitted that the other principal grasses now cultivated in the Northern States were obtained from Europe. Our red top (*Agrostis vulgaris*) was cultivated in Europe long before its introduction here. The same may be said respecting orchard grass (*Dactylis glomerata*), meadow fescue, sheep's fescue, meadow foxtail, and meadow oat grass. It is also claimed that blue grass (*Poa pratensis*) came from Europe, notwithstanding that it is clearly a native grass in our mountain regions.

But although the Southern States were settled earlier than the Northern ones, there was a very different condition of agriculture as respects grazing and hay-making. In some of these States the climate permits of the growth of grasses during the greater part of the year, or indeed of the entire year, some species making their growth during the hot season and others during the colder months, so that cattle may obtain subsistence in the field, and hay is little employed except for working horses and oxen. But these places suffer from protracted drought in summer and fall, when vegetation is burned up, and cattle and sheep are not able to find a sufficiency of feed. This difficulty greatly restricts the grazing industry in the South, and the great want of agriculture in that section is the introduction of grasses that will maintain growth and vigor through these periods.

According to the census statistics of 1880, there were in the two States of New York and Pennsylvania a greater number of cattle and horses than in the six States of Florida, Alabama, Georgia, South Carolina, North Carolina, and Virginia. The grasses that have been so successful in the cooler climate of the Northern States have not proved adapted to a large portion of the Southern Atlantic and Gulf States. A number of new grasses have been tried, and some of them with greater or less success in certain localities, but these experiments have been very limited, and the benefits of them have not become extensively diffused. This result may be partly due to apathy on the part of the people and partly to the speculative prices at which seed of the new grasses has been held. Even in the Northern States new grass seeds would not be rapidly diffused if sold at the rate of $1 per ounce. The people of the Southern States are generally poor and unable to spend much money in experiments. Probably, also, there is more or less want of confidence in the disinterestedness of those who are offering to sell new and high-priced grasses.

Here undoubtedly is a legitimate and useful opportunity for the aid of the Government—an opportunity for widespread and general benefit, more practicable than the introduction of tea culture—and yet it has received little or no recognition.

Were there but one or two properly conducted experiment stations somewhere in the belt of country now under consideration the question of suitable grasses for culture could be solved, not in one year nor in two years, perhaps not in five or ten, for many new kinds of grasses would need to be placed under trial on different soils and in different conditions of humidity. These trials should be made on a sufficiently large scale, five or ten acres each for perhaps twenty new kinds, and these should all be given the best opportunity to develop themselves, to test their feeding and nutritive qualities, their ability to bear the tramping of cattle, and on all other points necessary to prove their usefulness. A few years of faithful experiment in this direction could not fail to secure a vast amount of valuable information, and in this time the promising and successful kinds could be diffused with little or no cost to the farmers and agriculturists to enable them rapidly to begin their culture and soon reap the benefits of the knowledge obtained.

But it is not in the Southern States alone that new agricultural grasses are wanted. Our country contains so large a territory, with so many variations of soil, climate, and other conditions, that no one or more kinds of grass can be expected to thrive in all parts. In considering this question the extensive interior region called the arid plains can for the present be left out of view, as there is no probability of their being subjected to agricultural processes for a long time to come. But there is a region north of Kansas, including portions of Nebraska, Wyoming, and Dakota, which is rapidly being filled with farmers and small cattle raisers, where in a few years there will be a great demand for grasses suitable to the climatic conditions there prevailing. Indeed, this demand has already begun, and one knows not with certainty what reply to make to the inquiry. It is not proper that this broad and fertile region should be left to struggle with the problem without system and without governmental aid.

There is little doubt that every section of the country contains native grasses which would meet the requirements of agriculture in that section. An intelligent and thorough knowledge of the native grasses is first to be obtained, and then an efficient course of experiments at some suitable place, where the adaptation and value of the prominent and promising species could be ascertained.

There is another region on the Pacific coast where this question is already a very important one, and where a similar course of experimentation is urgently demanded.

There are other smaller districts, probably, having peculiar conditions of climate, where an intelligent and systematic trial should be made of native or of promising foreign grasses for agricultural uses.

But for present purposes the country may with reference to its grazing and haymaking facilities be conveniently divided into four sections, viz:

1. A northeastern one, covering the ground east of the Mississippi River, including Kentucky, Virginia, and the States north of the same.
2. A southeastern one, including North and South Carolina, Florida, the Gulf States, and a portion of Texas.
3. A north central district, including the more elevated country north of the Pacific Railroad and west of the Mississippi River to the base of the Rocky Mountains.
4. The Pacific coast region, extending from Alaska to Lower California.

If the Government would establish and equip in each of these regions, under the direction of the Department of Agriculture, an experiment station for the testing of grasses and forage plants, including the clovers, alfalfa, and other fodder plants, an immense boon would be conferred upon the agricultural interests of the country. Each station should be in the care of intelligent, reliable, practical agriculturists, with the aid of proper scientists, and should be so equipped as to make thorough trials under varied conditions of soil and humidity, so as to determine the value of different species as to quantity and quality of product.

The agricultural colleges of the various States can do something in this work, but they have such a multiplicity of other interests to care for that they hardly can give this subject the attention it requires. It would be much better to concentrate in a few stations the efforts of a well equipped corps of experimenters having this work alone to attend to. The importance of the work fully justifies its being made the subject of special experiments, and these central stations could co-operate with and assist the State institutions.

As the result of a pretty extensive acquaintance with the grasses of this country, we will venture to point out some which give great promise of utility, and which would properly be made the subject of experiment.

In that portion of the country which we have called the first district there is perhaps a very satisfactory condition as to the cultivated grasses, at least very satisfactory as compared with the other districts. But even here there is room for much experiment in order to an improvement in meadows and permanent pasture lands.

We have received from a farmer in Northern Illinois a very interesting account of a successful and satisfactory experiment with one of our native grasses called wild rye grass (*Elymus virginicus*). This he saw growing in Iowa, and was so much pleased with the appearance of the grass that he gathered a handful of the seeds and planted them on his farm; he continued extending this grass for several years, so that last summer he mowed 12 acres for hay and had several acres in pasturage, and he is well pleased with it both for hay and pasture. This experiment serves to show that some of our native grasses deserve attention, and may be made to add greatly to our resources. Other Northern grasses deserving attention for culture in the first district are *Millium effusum*, *Phalaris arundinacea*, *Cinna arundinacea*, *Deyeuxia canadensis*, and *D. nuttalliana*, *Poa serotina*, and *Glyceria nervata*. It is highly probable, also, that some hardy and productive species might be beneficially introduced from the northern Rocky Mountains.

We turn now to the second district, called the southeastern one. Here, as has been stated, there has been long felt an urgent want of new grasses adapted to that peculiar climate. Investigations and experiments have been prosecuted by a few persons and by some agricultural colleges. A recent bulletin of the Agricultural and Mechanical College of Texas states that thus far they have found but few grasses that even promise well, the great trouble being the long drought, which kills everything not extremely tenacious of life. From the peculiar conditions of that climate any chance to secure a forage plant that will thrive must be limited to two classes of vegetation, viz: (1) perennial plants of the most hardy and vigorous nature, which send out strong, vigorous roots, running far down below the influence of the scorching summer heat, or which give out subterranean or creeping rootstocks; and (2) plants which spring up in fall from the seed, grow more or less during the winter, but rapidly in the spring, and ripen their seeds before the approach of the hot season.

This bulletin also states that under the first class of perennials nothing has given such marked satisfaction as Texas blue grass (*Poa arachnifera*). Last summer was the most severe drought known for years in that locality, yet the roots of this grass seemed to derive new vigor from the summer's inactivity, pushing out a wonderfully fine growth for winter pasturage, and ripening an abundant seed crop about the 1st of May. It seems to be rapidly spreading over a considerable portion of Central and Northern Texas, especially that portion between the Brazos and Trinity Rivers, and it has already obtained considerable foothold in Ellis and Johnson counties. As a hay crop, while not equaling Johnson grass in quantity, it certainly has the recommendation of very fine quality, and as winter pasture it is unexcelled. Similar statements respecting Texas blue grass could be greatly multiplied, and from several Southern States. Several other native grasses have been highly recommended. Among them we may mention several species of *Paspalum*. These take a strong hold on the ground, some by means of vigorous long roots, and some by means of creeping, many-jointed stems; they grow rapidly during the hot summer, furnish a good amount of forage, and bear the tramping of cattle with little injury. Another native grass which has been strongly recommended is the *Phalaris intermedia*, locally called Gilbert's relief grass or American canary grass. This is one of the most valuable winter grasses, and is said to be excellent, both in quantity and quality, for winter and spring grazing. Its culms are said to be tender, sweet, and juicy, and eaten with great relish by all kinds of stock.

Another native perennial of promise is the *Tripsacum dactyloides*, sometimes called gamma grass, sometimes sesame grass. It is a strong, tall, thick-stemmed grass, generally gowing in tussocks, producing an immense amount of foliage, which when green is sweet and nutritious. Under favorable conditions it may be cut five or six times a year, and compares well in quantity and quality with Johnson grass, but is not as tenacious of life, and suffers more from constant tramping of cattle.

Of annual grasses for winter forage, *Bromus unioloides* or rescue grass is perhaps the most promising. It is said to be tender, sweet, and greedily eaten by stock. It starts growth late in the fall, grows rapidly at the approach of spring, and ripens its seeds in May. It does not commonly need resowing, as the seed which falls on the ground is sufficient for the next crop; this lies dormant all summer, but springs up quickly after the fall and winter rains.

A very valuable grass for a hay crop in the South is the Texas millet, *Panicum texanum*, also called concho grass in some parts, in others Colorado bottom grass. It is cut twice and sometimes three times in a season, yielding 1½ to 2 tons per acre at each cutting. It is superior to Hungarian grass in quality and also in quantity, and might probably be substituted with advantage for that species in the Northern States.

Another species of *Panicum* has also been tried by a few persons, which has much resemblance to the preceding, and probably fully equals it in quality and quantity, namely *Panicum proliferum*, variety *geniculatum*, sometimes called sprouting crab-grass. This would also be a valuable acquisition for the North.

Two species of wild rye-grass, *Elymus virginicus* and *Elymus canadensis*, are also recommended by Southern writers, and are deserving of extended trial. The former species has been already mentioned as successful in an experiment by an Illinois farmer.

These are a portion of the native grasses which give promise of value for Southern culture, and which together with other foreign kinds, greatly need the aid of the Government to establish their relative utility, and to aid the rapid and cheap diffusion of such as prove to be deserving and successful.

In the third district, the north-central one, we are yet almost entirely without help from practical experiment as to what grasses will be suitable to the wants of that region. But we should mainly look to the native species for the future wants of that portion of country. An intelligent scientific investigation should be made of the grasses now prevailing in the mountains, valleys, and table lands, and a selection of the most promising of these should be submitted to careful and thorough experiment. Some most valuable hints on this subject are given by Prof. F. L. Scribner, in a paper recently published by the Society for the Promotion of Agricultural Science. Professor Scribner spent the summer of 1883, while connected with the Northern Transcontinental Survey, in an examination of the vegetable resources of Montana, and directed his attention "especially to the forage plants, the grasses, in order to determine their general prevalence and the actual relative and probable values of the several species for pasturage or for hay. The region abounds in a great variety of species, the whole number discovered being one hundred and twelve. Some of these are of rare occurrence; many have little or at least no recognized agricultural value." The most valuable species mentioned by Professor Scribner, are (1) a species of mountain foxtail, *Alopecurus pratensis*, variety *alpestris*, very closely related to the meadow foxtail so much esteemed in cultivation in Europe; (2) two or three species of *Stipa*, commonly called feather grass, and wild-oat grass, which are said to make excellent hay; (3) *Oryzopsis cuspidata*, one of the most esteemed of the bunch grasses, and which thrives on soil too sandy for other valuable species; (4) *Phleum alpinum*, called native timothy. At elevations between 5,000 and 6,000 feet he saw this growing in rich open woods along with common timothy, and it was the more luxuriant of the two, not so tall perhaps, but growing to the height of 2 feet, with larger and more leafy culms; (5) *Agrastis exarata*, which apparently is a valuable grass, and may take rank with the *Agrostis vulgaris* or red-top of the Eastern portion of the country; (6) *Kœleria cristata*, called June grass, although quite different from our Eastern plant; (7) several species of *Poa*, some of which have as fine an appearance and as heavy a yield as the Kentucky blue grass, which also grows wild in that region. The most common of these *Poas*, and most characteristic is *Poa tenuifolia*. "It constitutes the chief forage upon the driest bench lands, where it is called bench grass, or, on account of its reddish color, red-top, or red-topped buffalo grass;" (7) *Festuca scabrella*, the great bunch grass or buffalo bunch grass, which is one of the principal grasses of the country; (8) *Bouteloua oligostachya*, there called buffalo grass or mesquite, the same that is called gramma grass in Colorado and New Mexico; (9) *Agropyrum glaucum*, the blue joint or blue stem of the settlers, and more highly valued for hay than any other grass, but very different from the blue joint of some other districts; (10) *Elymus condensatus*, one of the wild rye grasses, chiefly valued as a winter forage grass. "As fine a field of natural grasses," says the professor, "as I saw in Montana, contained *Poa tenuifolia*, *Kœleria cristata*, *Stipa viridula*, and *Stipa comata* as the leading species, the *Poa* being the most abundant."

Here we have a good list to begin experimental culture with for this third region, and yet there are many others to draw upon if they do not prove suitable. Many foreign species of cultivation in similar latitudes and similar conditions may also be given fair and thorough trial.

The fourth or Pacific coast district extends over a long stretch of country varying greatly in climate, soil, &c., and should be divided into two sections, a northern and a southern one. The northern part, including the western portion of Washington Territory and Oregon and the northern portion of California, is very humid and extremely well adapted to the growth of grasses, of which there is a large native variety. How far these native grasses are employed in grazing, and whether the cultivated kinds prove sufficient and satisfactory or not, are points on which I am not well advised. But the eastern portion of Washington Territory and Oregon, having a much lighter rainfall and long summer droughts, will probably very soon be called upon to investigate the subject of permanent agricultural grasses.

There is a large variety of native species in that district, many of which are known under the name of "bench grass," and include *Festuca scabrella*, several forms of *Poa tenuifolia*, *Elymus condensatus*, *Agropyrum glaucum*, and others.

Much of the cattle business of this district is of the *ranch* kind, in which the cattle are during the summer months driven for pasturage into the adjacent mountains.

The southern portion of California contains large areas of arid lands, and pasturage is very sparse. The rainfall is too light to be favorable to the growth of grasses of the ordinary kinds, and much investigation and prolonged experiment is needed for the introduction of such kinds as will best answer the requirements of the climate.

On irrigated lands the grasses and various forage plants, such as alfalfa and clover, produce enormous crops, but such lands are too valuable for the cereals, for vineyards, orchards, and fruit culture, to be appropriated extensively to pasturage or cattle feeding.

# AGRICULTURE IN COMMON SCHOOLS.

By F. G. ADAMS, of Topeka, Kans.

In responding to the invitation of the honorable Commissioner of Agriculture to present to the convention of the representatives of agricultural colleges a paper on the subject of "The importance of teaching agriculture in common schools," I shall briefly give the results of inquiry, observation, and reflection during the past ten years in the discharge of duties in connection with educational committee work in the Kansas State grange.

Statistics show that of the children attending the common schools in Kansas 59 per cent. are of the agricultural class. The same must be measurably true in respect to other States. Taking the children of all industrial classes together, agricultural, mechanical, manufacturing, and laboring, they constitute 88 per cent. of all the children of the State.

Children do not attend the common schools for an average period of more than five and one-half years of six months each year. In other words, the children of the industrial classes do not receive more than an average of thirty-three months' schooling altogether. The course of study is confined almost wholly to reading, writing, spelling, arithmetic, geography, and English grammar.

It is found that of the youth of the agricultural class of school age in Kansas but one in every six hundred and six reaches the agricultural college. This is true, notwithstanding the fact that the Kansas State Agricultural College is a popular institution. Its course of study and the efforts made by its president and professors to extend the benefits of their work as widely as possible among the people give the institution great favor with all intelligent farmers throughout the State.

Taking Kansas as an example, it is plainly to be seen that the agricultural colleges do not answer the end of the diffusion of the benefits of the agricultural college grant in any direct manner among the masses of the class chiefly intended to be benefited by it. It seems appropriate, then, that the head of the Agricultural Department of the Government, in his educational inquiries, should suggest the possibility of teaching agriculture in the common schools—those other colleges in which from necessity the great body of the children of the farming class must receive all their schooling.

## SUBJECT DEFINED.

The subject of this paper, as designated by the honorable Commissioner, has not been defined by him. What is meant by the proposition that agriculture may possibly be taught with propriety in the common schools should be definitely understood in the outset. So far as discussed in this paper it may be understood that the suggestion is primarily that manual training to some extent should be employed in the country district schools as an educational means, within the accepted meaning of the term education—the culture of the mind. It is suggested that such manual training, while it shall serve the primary object of education, may be made to consist of such modifications of the exercises now employed in the agricultural colleges, technical schools, and manual training schools as will have some tendency to fit pupils for their future occupations on the farm and in the country household. The signification of the term manual training may be best understood by reference to the manner in which it is employed in the technical, manual training, and other schools of a like character, so many of which are being established in our cities, with such great promise of usefulness.

According to Prof. Felix Adler, director of the Workingman's School, New York City, manual training, primarily, is not employed for the object of making education subservient to industrial success, but that the acquisition of industrial skill shall be made a means for promoting the general education of the pupil; that the education of the hand shall be a means of more completely and more efficaciously educating the brain.

General Francis A. Walker, president of the Massachusetts School of Technology, Boston, says manual instruction and training are introduced in such schools "as a part of the general education of the scholar, with reference to the fuller and more symmetrical development of all his faculties and powers, and to promoting his success in whatever sphere of labor it shall subsequently be determined he is to enter."

"In manual education," says Prof. C. M. Woodward, director of the Saint Louis Manual Training School, "the chief object is mental development and culture. Manual training is essential to the right and full development of the human mind."

"I am satisfied," says Dr. Belfield, of the Chicago Manual Training School, "that three years of a manual training school will give, at least, as much purely intellectual growth as three years of the ordinary high school. My opinion is, that an hour in the shop of a well-conducted manual training school develops as much mental strength as an hour devoted to Virgil or Legendre."

Mr. Goss, of Purdue University, Indiana, says manual training is mental training by hand practice. He considers an hour in the shop as valuable for intellectual training as an hour of book-study.

It is true that many who have looked in upon the work of the manual training schools, which are so fast taking hold upon the intelligent industrial educational sentiment of the country, see in them that which will solve the apprenticeship question and other questions which pertain to labor and the mechanical arts in this inventive period. Says Col. Augustus Jacobson, of Chicago, in his address at the opening of the manual training department of the Toledo, Ohio, High School: "The apprentice system was the old method of training skilled artisans, but of late years the trades unions have not permitted apprentices to be taught. The manual training school teaches no particular trade. It teaches the rudiments of all the trades. There are only seven hand tools—the ax, the saw, the plane, the hammer, the square, the chisel, and the file. The graduate of a manual training school has not learned a particular trade, but he is within from one to three months of knowing quite as thoroughly as an apprentice who has served years, any one of twenty trades to which he may choose to turn. Having learned the use of all the tools, he can easily turn to any modification of them he may need in any employment. He is a superior draftsman; he has an intelligence far beyond that of the average artisan, and the three years' apprentice is in no wise to be compared with him. If thrown out of one employment by the invention of a machine, the graduate of a manual training school can easily turn to any other employment. The boy who has learned the use of all the tools has found out his bias, if he has any, and he can then go in the direction in which he is at his best. When the curriculum of the manual training school, which embodies the production of superior bread-winning qualities together with high mental training, shall, in the public high school, free of charge, become the birthright of every child in the land, it will become clearer to all that more schooling will make better bread-winners. The bread-winning training will lure parents and children, and it will lure the children into superior intelligence."

By the suggestion, then, that agriculture may be taught in the country district schools, this innovation upon existing methods need not be supposed to contemplate, primarily, the teaching and practice of general farm work in connection with the school. The correction of errors in usual modes of instruction is proposed. By shortening up modifications, time, it is believed, may be saved to be applied to such character of educational work as to accomplish the essential objects of school education through means other than the traditional plan, whose chief feature has been that of a dry drill in the memorizing of words without application. It is suggested that the methods so well worked out in the kindergärten and in the technical and manual training schools, with such modifications as reason and common sense shall suggest as applicable, shall be brought into the common schools. Such modifications may relate to the imparting of some knowledge of those sciences and of those branches of information which have direct relation to the farmer's life and surroundings, to farm and household occupations and enjoyments.

Accepting, then, the view that the primary object of public education should be: mental and moral cultivation, in the direction of developing good citizenship, that it should be the training of the minds of our children, their powers of observation and reasoning, and their moral natures; and laying aside all considerations in regard to education of an industrial character, as such, may not there be carried on, as a part of the common school educational work, a line of reading, observation, conversation, and manual practice, in the school-room, in the field, forest, and neighborhood, such as would be calculated to explain the things in nature and in common life by which country school children are surrounded; tending to expand the mind by thought and reasoning based upon observation of natural objects and of the laws and arrangements governing plant and animal life, the rocky strata, the composition of the soil, and the compositions which enter into domestic affairs in the household.

In the discussion of this subject it is impossible to do otherwise than to go down into the country school-room itself. The subject relates to what may be regarded as the small things of small pedagogy. Of these, this paper will, in some measure treat, in all seriousness, and with the conviction that they are in no sense small things.

### DEFECTS IN COMMON SCHOOL METHODS.

Looking, then, to proposed modifications and curtailments of existing methods of instruction in our common schools, investigation and inquiry have brought out the testimony of a multitude of witnesses in support of the following arraignment of the defects in the educational work now done in these schools :

That the work is superficial in its character; that it is defective in method; that it is narrow in its scope.

In respect to arithmetic and geography, the range of particulars is too broad; taking in, in detail, unimportant subjects, and necessitating a superficial study of important ones. Penmanship, and study and practice calculated to impart an ability to speak and write the English language correctly are sadly neglected.

The study of English grammar, so called, is carried to great lengths in a manner but little calculated to induce correct expression in speaking and writing the mother tongue.

The knowlege of reading, writing, geography, and of the elements of numbers, as acquired, is abstractly employed. Such acquired knowledge is but little used in connection with inquiries respecting the natural objects with which the children are surrounded and concerning affairs of daily life, conversation, and newspaper reading. Writing is not employed in recording that of which the senses should be led to take cognizance, and neither writing, map studies, nor numbers are brought into uses calculated to draw the minds of pupils into a living sense of acquired power and increased mental force. Little grows out of the system which the pupil can appreciate as preparing him for the place he should take in the world of intelligent progress for which his education should fit him.

### GENERAL DEFECTS.

As to the fact that education in our common schools is generally defective, the testimony from all quarters affirms the charge. It is now many years that these defects have been contemplated and deplored.

Said the board of education of the State of Massachusetts in 1870, "the public school system of New England, so well adapted to a former state of society, fails to meet the demand of our modern civilization." Commenting upon this declaration, the United States Commissioner of Education declared it to be "the indictment of the thinkers of the day against the present school system."

Up to 1875 the schools of Quincy, Mass., as affirmed by the town school committee, had been running in a "rut," the school work was all "smatter, veneering, and cram;" all of the money spent on them "not 50 cents out of each dollar were effectively spent." "Everything had been taught separately. The reading lesson, the writing lesson, the spelling lesson, had, in regular order, followed the lesson in grammar, and in arithmetic, and in geography, and in history. The children could glibly tell what a peninsula was, but did not know one when they lived on it. They could stand up and spell in spelling-bee, but put a pen in their hands, and the havoc they made with orthography was wonderful." They could "parse and construe sentences, and point out the various parts of speech with great facility, repeating correctly, and with readiness the rules of grammar applicable in each case; yet, when called upon to write an ordinary letter, they were utterly unable to apply the rules and principles they had so painfully learned, or to form single sentences, or to follow any of the common rules of practice in composition. In reading anything that had not been learned by rote, the scholars could merely stammer and bungle along."

Says Mr. Z. E. Jameson, chairman of the educational committee of the State grange of Vermont:

"The schools are small in this county, averaging less than twenty scholars in daily attendance in each school. These are of all ages from four to twenty years, and of various grades of ability, and naturally make many classes, so that ten minutes or so are all that can be allowed to each class. They read, spell, and recite geography, arithmetic, and grammar. Nothing is taught of music or drawing, or of the soil, stones, vegetation, birds, insects, or anything relating to any craft or vocation. The better the teacher is educated the less inclined she is to consider industrial pursuits worthy of being taught. I say she, as a majority of teachers in common schools are females.

"The education the common people get does not enable them to exercise that fearless, independent action that should result from independent thought, and a consciousness of existing wrongs.

"That is, in caucuses, conventions, and legislatures the best farmers are no match for the ordinary lawyer; and the mass of farmers are as helpless to demand and secure their rights by speaking or writing, as children in swaddling clothes. There are about 80,000 children in the State, and the cost of schools is annually about $600,000, yet from this great taxation and this number of scholars, if there are a dozen farmers manufactured that can exert the influence of one second-rate lawyer the fact does not appear. Our present system does not allow of a thorough education without driving from the mind a love of the farm and a respect for all manual labor"

Hon. Newton Bateman, superintendent of public instruction for the State of Illinois, in 1876:

"Look at the facts as they have existed in this State from the beginning of the free-school system and for years before. What have been the studies prescribed by law? Spelling, reading, writing, arithmetic, grammar, geography, and United States history. If it were distinctly proposed to devise a scheme whereby the schools might be rendered the least profitable, that which compels the youth of the State to spend the whole of their school-going life upon the famous seven branches of the old Illinois law, to the total exclusion of everything else, must be regarded as a reasonably successful solution of the problem. It is not to be denied that the confidence of our people in that great American institution, the public school, is in danger of being disturbed. Nor is this state of things peculiar to Illinois, but is substantially common to all the States and to the whole country. Doubts, questionings, murmurs of discontent, mingled with voices of direct opposition, or appeals for reconstruction and improvement, are coming up from every quarter of the Union."

Prof. William F. Phelps, late president of the National Educational Association:

"No more important subject can engage the attention, either of your particular organization or of the people generally, than that which is covered by your very searching and intelligent inquiries. Upon the proper practical solution of the questions raised in your circular largely depends the real success of our great common-school system and the prosperity and well-being of the citizens of this Republic, more than 80 per cent. of whom belong to the industrial classes whose school period is limited to the brief space of five or six years. Having been for more than thirty years engaged in the work of elevating and improving our common schools, and having bestowed the best thought of a long professional life upon the problem of the ways and means to that end, I am prepared to announce myself as in hearty sympathy with the views expressed in your circular."

G. Sprague, editor of the Western Home Journal, Des Moines, Iowa:

"There is no denying the fact that our system of education is too much confined to a rut. Teachers become enthusiasts not in the direction of making education simple and practical, but in aiming at the greatest attainable evidences of the strain to which the young mind is susceptible, overlooking useful results and practical applications."

General John Fraser, late State superintendent of public instruction for Kansas:

"Time required to give instruction in added branches can be easily found by restraining within proper limits arithmetic, English grammar, and geography, which have run wild in our common schools."

M. E. Hudson, late master of the Kansas State grange:

"The subject you have in hand is one that needs probing to the bottom. Our educational system is sadly at fault somewhere. Our common schools cost four times what they did forty years ago, and yet pupils at the age of twenty-one years leaving the common schools had a better practical education than now, and that notwithstanding the further fact that our children attend school twice as long, on an average, now as then. Why is this?"

Prof. William K. Kedzie, of the Kansas State Agricultural College, 1876:

"I believe your work will result in most substantial good for the common-school system of this State. There can be no doubt that the curriculum of our common schools is unnecessarily narrow in its scope, and the amount of time spent on certain branches of study, to the utter exclusion of others of equal importance, is little better than wasted. This is especially true of some studies, in particular, English grammar, for instance, which, if a better method cannot be found for teaching it, should be thrown out bodily from our school studies."

Prof. F. H. Snow, of the Kansas State University:

"Allow me to express my full and hearty sympathy with you in this movement to reform the course of study in our public schools. I have long been convinced that more than half the time spent by our children in the common schools is worse than wasted in the attempt to make a curriculum which is in direct opposition to the natural order of development of the faculties of the human mind. It seems to me that there should be a radical change in our methods of instruction for children between the ages of five and fifteen. They should no longer be required to devote their chief attention to the memorizing of abstract rules in arithmetic and grammar and of unimportant geographical facts. The time now squandered in this way should be devoted to studies which not only furnish a valuable training to the powers of observation, but also impart information of great practical value to the masses of our people."

## SPECIFIC DEFECTS.

As to arithmetic, I appeal to the observation of all, if it is not rarely the case that the boy or girl from our common schools exhibits any practical ability to perform operations in numbers, in common transactions? This is true, as almost every parent knows who has sought the aid of his boy in computations relating to sales or purchases. Neither proficiency nor accuracy marks any effort made in such computations. Yet the boy has gone through his arithmetic. He has memorized, and, if fresh from school, possibly can repeat the rules for the most difficult operations. He has performed all the examples under every rule in his book, of several hundred pages. But set him to add a ledger column of dollars and cents, and, after much labor he will get an incorrect footing. Ask him to make for you a statement, from your books of account, for use in a settlement you may desire to make, and he will be utterly unable to do it. He neither knows how to head the statement, how to set out the items, how to place the credits, nor how to show the balance. Ask him to compute the interest on a promissory note you may have falling due, and, though he remembers to have studied the subject of interest, he has no recollection of what rule applies to the matter in hand, and he gives it up as something not taught in his arithmetic. Yet he has gone through his arithmetic; and has memorized a hundred rules and definitions, and, of course the very rules which apply to the case in hand. He has skimmed over all that he should have thoroughly learned, and tasked his memory, infinitely, over that which he should never have been asked to learn.

State Superintendent Newton Bateman, of Illinois:

" Much precious time is also wasted upon arithmetic. It is believed that the average common school-text book contains double the amount of matter necessary or advisable, and hence that half of the time spent thereon, if not wasted, could be more profitably devoted to other studies.

" There lies before me a popular school arithmetic, of about four hundred pages. It is deservedly popular, one of the best of which I have any knowledge—in some important particulars the very best. It is in use in hundreds of our common district schools, probably in thousands. It was made for common schools, the title-page so declares. Turning the leaves of this book, I note, at random, among the topics discussed at considerable length, the following matters: Least common multiple of complex fractions, duodecimals, repeating decimals, average of accounts, conjoined proportions, alligation (medial and alternate), square root and cube root, arithmetical and geometrical progression, casting out the 9's in multiplication and division, the metric system, computation of radix, &c.

"The list given of topics which are of no actual, if imaginable, benefit to one common-school pupil in ten thousand—viewed from the utilitarian standpoint—might be more than doubled. I knew a boy who spent all the spare time he could command for an entire term—more than an hour each day—upon circulating decimals and alligation; and when he had mastered them, the poor child thought he knew something and so he did, but what? He completed the district school course, shouldered his implements of toil, and went bravely out to earn his bread by the sweat of his face. Of Nature and her works, her protean changes, her laws and forces, her glories and harmonies, he was ignorant. The

'Primrose, by the river's brim,
A yellow primrose was to him,
And, it was nothing more.'

But, then, he knew all about repeating decimals, and alligation, medial and alternate."

Hon. J. M. McKenzie, late State superintendent of Nebraska:

" In regard to arithmetic I am confident much time is wasted because of the defective methods employed and the haste in passing over the elementary principles. Pupils wander over a dreary waste in worse than Egyptian darkness because the teacher permits them to pass over principles they do not understand and cannot apply.

" Rapid and accurate computation of numbers should be the leading object of the teacher. I have long been of the opinion that there is too much abstract theory in our arithmetical teaching. Constant application of principles to the solution of practical problems arising in the transactions of business, with all forms of notes, receipts, bills, and book accounts, should engage the pupil's time and attention."

Hon. C. W. Van Ceolln, late State superintendent of public instruction of Iowa:

"In arithmetic educators and authors seem to have overlooked, to a considerable extent, that it has to do with practical life, and they have taken pains to puzzle, with curiously worded rules, the scholar and the teacher. I agree with the course indicated in your questions, and enforce them by saying that a child well trained in addition, subtraction, multiplication, and division, with a proper amount of common sense, is superior as an arithmetician to the average scholar trained by our present system of teaching arithmetic'.'

Dr. James Marvin, late chancellor of the State University of Kansas:

"I have long held and often expressed the opinion that all of our common-school text books were too voluminous. In arithmetic we find the whole scope of applied mathematics, even to the calculus of series and computations of higher roots. Parents purchase, and feel defrauded when teachers suggest the omission of any parts of these books in their course of instruction. Much in these books is never applied in ordinary practice and is too carelessly passed over to secure any good purpose as mental discipline."

President William F. Phelps, of the Wisconsin State Normal School:

"In arithmetic the principal objects in the common schools should be, first, to familiarize the pupil with the power of numbers; second, to give facility and accuracy in writing, reading, adding, subtracting, multiplying, and dividing them; third, to impart a thorough knowledge and skill in handling fractions and decimals; fourth, to acquaint the child with the weights and measures of the country and their application, and with percentage and its applications to the problems of daily life. Accuracy and rapidity here are all important, leaving reasons to be sought in the school of life by those who have the capacity, disposition, and leisure to pursue them."

### GEOGRAPHY.

In geography, by prevailing methods, there is far too much abstract memorizing; too much forced effort to load the memory with definitions and descriptions so unconnected with events and narrative, as that the study is divested of all interest, and, consequently, no lasting impressions are left upon the pupils' minds. The facts are imposed upon the memory repulsively, and are therefore soon forgotten. Definitions of natural divisions, and long descriptions of countries and their physical features are required to be memorized in a manner so dissociated from everything within the pupil's knowledge, or within the scope of his reading and conversation, that no thought or consciousness is elicited upon which the mental effort is expended that has any relation to the world in which we live.

C. C. Post, secretary of the Indiana State Grange:

"When I was fourteen years old I could look on the map and tell the name of nearly every stream, lake, city, or mountain in the United States. Ten years afterwards I only remembered such as I had connected with some idea or fact. I remembered the position of New Orleans because of its connection with the history of the country; and I remembered cities, towns, and rivers in America and Europe and Asia, not, as I verily believe, because I had learned them at school, but because I had learned to connect them with some fact in history, gleaned from book or newspaper that fell in my way. And if I were to attempt to teach another, I would select for his reading a history of the country of which I wished to teach the geography, and with that and a map, globe, and newspaper, carefully selecting articles descriptive of life, and chronicling passing events in the country to be studied, I believe the pupil would fix more firmly in his mind the geography of a country in a month than he would in a year in the way usually employed. He would, too, be acquiring a love for study and reading. The occasional searching of the map for places of which he read would give a knowledge of all countries, and the relation they bear to each other geographically, commercially, and politically, and would make interesting to most minds what is generally of very little interest."

### ENGLISH GRAMMAR.

In respect to the study of English grammar the methods prevailing are open to still greater objection. The object should be to inculcate habitually correct expressions in speaking and writing the English language in accordance with good usage.

But the methods prevailing in our schools do not consist of the practice necessary to induce such habit. On the contrary, it consists of the memorizing of definitions, rules, exceptions, and formulas, without practice in correct speaking and writing; without application of that which is memorized.

Says Hon. John Montieth, late superintendent of public instruction of the State of Missouri:

"The teaching of grammar should have a better substitute; the present system fails of any practical result."

Prof. M. A Newell, principal of the State Normal School, Baltimore:

"Among modern writers of distinction not one in a hundred ever studied English grammar as such. We learn to sing by singing, and to draw by drawing, and in the same way we must be taught to speak and write correctly, by speaking and writing. Text books in grammar should be abolished in all grades below the high school."

Cincinnati School Report:

"Instead of reserving grammar as a study for the highest grades, a course was constructed to begin with the child's first day in school, and keep him company through every grade. The teacher is not to aim at a recitation of grammatical rules and definitions, but at a ready and correct use of the language itself, the latter alone having a real and practical value in the future career of the child. All text books are excluded from the district schools. In the primary schools object lessons form the basis of language lessons, the child acquiring the habit of ready and correct expression as he acquires the habit of observation."

Prof. A. S. Hill, in Harper's Monthly Magazine for June, 1885:

"It is high time that every vestige of the Lindley Murray system—parsing, analysis of sentences, and the like, as well as grammatical rules and exceptions—was swept out of the schools."

### CONCERNING REMEDIES.

Such criticisms might be quoted indefinitely. They do not apply to all schools. Conviction so strong and widespread, as to needs of reform, must of necessity have resulted in efforts at reform in many places. In city schools, quite generally, there has been much improvement. Normal schools and county normal institutes are accomplishing something for the country district schools. But a generation of awakening has brought about no adequate changes.

The Quincy, Mass., school committee, to whose work reference has here been made, having, in 1875, come to a knowledge of needed reform in their town schools, hunted up a superintendent, Colonel Parker, for the undertaking, and charged him with the work of bringing it about. In 1879 the result was published. Having found that, as had been taught in their schools, English grammar was a singularly unprofitable branch of instruction, it was immediateiy "hustled out," and the reader was sent after the grammar, and the spelling-book after the reader, and the copy-book after the speller. Then the process of simplification began. Reading at sight and writing off-hand were to constitute the basis of the new system. These were to be taught by incessant practice, book and pencil in hand. Instruction in reading, writing, grammar, spelling, and to a very considerable degree history and geography, were combined in two exercises, reading and writing. The old reader having disappeared, the teacher was at liberty to put into the hands of the class geographies, or histories, or magazine articles, and having read them first, the scholars might write of them afterwards, to show that they understood them. Their attention was thus secured, and the pen being continually in the hand, they wrote as readily as they spoke, and spelling came with practice. Under this system the absurdity of ever having expected any adequate results from the old one became apparent.

As to geography, the reform made the study a thing of life. "Go to-day," says the 1879 report, "into the Quincy schools, and in a few moments two or three young children standing about an earth board, and handling a little heap of moistened clay, will shape out for you a continent, with its mountains, rivers, depressions, and coast indentations, designating upon it its principal cities, and giving a general idea of its geographical peculiarities." And thus the new method became full of interest.

As to grammar, the examiner expressed a doubt if one scholar in ten knew what a noun, a pronoun, or an adjective was, or could have parsed a sentence, or explained the difference between its subject and its predicate. They could, however, put their ideas into sentences on paper with correctness and facility.

The scholars could read at sight, without bungling and stumbling over every unusual word the moment they left the familiar page of their readers. They could write a simple letter without being painfully conscious of an unaccustomed labor. There was an entire change of spirit, and going to school was no longer what it had been. The "whining school-boy" was not now to be seen "creeping, like a snail, unwillingly to school"; and, remembering what had been, it was most pleasant to go into the rooms and feel the atmosphere of cheerfulness, activity, and interest which pervaded them.

Reasons why radical improvements in all our schools have not been brought about through such examples as that of Quincy and elsewhere, for many such have come to notice, are suggested in the reading of the following from a letter written by President Charles L. Ingersoll, of the Colorado State Agricultural College, last December:

"The matter you propose is one of vital importance, but one in which there can no radical change be made at once. In Scotland the teachers are taught the subject of domestic economy, and compelled to teach it in their schools. A beginning could be made in this way but for the fact that our teachers change much more rapidly than those of foreign countries. In the West the majority of teachers are females. These do not average more than five or six terms, and then marry or quit the profession. We thus have a flood of young, inexperienced teachers as our working force. The agricultural colleges of our country will send forth their proportion of teachers prepared to do this distinctive work, and thus act as leaven. Of course I am aware that this appears slow, but with the supplementary work of good granges in the communities of the State a powerful adjunct to this work is found."

How can it be expected that reform should enter where there is no profession of teachers, where those engaged in the employment do so simply, as President Ingersoll truly says, to fill a temporary purpose, teaching but five or six terms, and then quitting the employment? There is no adequate provision for the education of teachers. Those who engage in the occupation are mere youth, who have in most cases received their only education in the very schools whose methods we condemn. They could not be expected to do better than those faulty instructors whose examples alone we have permitted them to observe.

Says the United States Bureau of Education, Circulars for Information, Rural Schools, No. 6, 1884:

"In 1881, in Georgia, out of 6,128 teachers 5,000 are represented as having limited education. If the other States be classified according to their showing, the greater number will be found to be on the side of Georgia. The number of public-school teachers in the United States, city and county, has reached a total of 293,294. It is impossible to state the number employed in the ungraded rural schools, but it must be a very large proportion of the whole; and, on the usual assumption that 30 per cent. of the teachers are changed annually, the State normal schools, numbering ninety eight in all, afford but a small part of the provision required for training teachers."

This circular quotes Mr. Fitch as saying in his address in the University of Cambridge:

"I know few things more pathetic than the utterances of some headmasters at their annual conferences, at which one after another, even of those who have fought their way to the foremost ranks of their profession, rises up to say 'We have been making experiments all our lives; we have learned much, but we have learned it at the expense of our pupils.'"

### AGRICULTURAL COLLEGE NORMAL SCHOOLS.

President Ingersoll says: "The agricultural colleges of our country will send forth their proportion of teachers prepared to do this distinctive work, and thus act as leaven." Here is a hint in the direction of reform. Since so few of the children of our farmers are able to reach the agricultural college for instruction within its walls (but one in every six hundred and six), should not the chief effort of these institutions be directed towards the education of the many in agriculture and the mechanic arts through instruction to come from trained teachers educated in their normal department, and should not such normal department be made the leading feature of the institution? Should not this normal and training department qualify teachers in a plan of education which shall embrace kindergarten methods, carried forward and merged into the manual training methods which have now been so well devised, with such modifications as should adapt the plan to the peculiar needs of country school children? The State might well give such encouragement to such normal-trained teachers as to lead to so large attendance upon this department as to multiply such teachers in sufficient numbers as to give a full exemplification of the improved methods in all parts of the State.

Pestalozzi summoned teachers to desist from the vain work of teaching the names of things, and to lead their pupils rather to a first-hand observation of things. Yet how few of the six thousand teachers employed in the common schools in the State of Kansas have any conception of what the proposition means: that pupils should be led to a first-hand observation of things rather than that they should be taught the names of things abstractly.

Froebel joined to Pestalozzi's observation teaching, hand work, construction, invention, art, and demonstrated the educating power of this mode in the infant class. The most excellent kindergarten instructor in the Kansas State Normal School, Miss Emilie Kuhlman, is now teaching the students of that institution an adaptation of Froebel's idea and methods in classes of more advanced pupils in country district schools.

Mr. George A. Black, of the Workingman's School of the Society for Ethical Culture, in New York City, has devised a course of object lessons for beginners in those natural sciences so nearly related to agriculture, horticulture, and household economy. Graphic representations and objects are the basis of his scheme. The various sciences, as zoology, botany, and mineralogy, are included. "In the course, beginning with bread, children from six to seven become acquainted with the different grains, in the forms of flour, seed, and the growing plant, and thus botany is introduced; also with the peculiarities of sand, clay, and chalk in soils, the beginnings of mineralogy are taught. Then they follow the processes of plowing, sowing, reaping, milling, and end by baking bread, having prepared it with their own hands. In other courses, as those of starting with milk, the egg, and wool, the domestic animals are studied, and a beginning in zoology is made. Botany is again reached in the study of the different woods and timber trees used in building; and mineralogy is continued in the slate, limestone, sandstone, brick, &c., to be seen in house construction.

"Two hours a week, for two years, are spent in this way, the lessons of the first year dealing with the requisites of food and clothing; of the second year, with the requisites of shelter and transportation. In the third year, the transition is made to the lassification and generalizing of the text books, a naturally directed observation having by this time furnished material for classification. Zoology, botany, mineralogy may now be taught independently for the pupil has seen the connection of these with each other, and with his own concerns."

And this is accomplished with children of the very poorest and uneducated classes in the city of New York by the time they have reached the age of ten years; children, too, who, in all their lives, have seen naught but brick walls and crowded steets, and never sunlight and nature, except during the two week's glimpses twice given them by their kind teachers in vacations taken among the hills of Pennsylvania. How much more might not there be accomplished with the children who all their lives have dwelt, inquiringly, surrounded by all the objects in nature.

"When I was a boy on the farm, and in the district school," says Prof. H. H. Straight, "I wondered why my teachers did not tell me about the trees of the forest, the weeds and flowers of the garden, pastures and meadows, the bowlders and rocks, with their scratches and shells." And who of us all, as a farmer's boy or girl, does not remember like unanswered longings in country school days?

It would seem that there should come out of the munificence of the Government, in the establishment of largely-endowed agricultural colleges, experiment stations and schools of technology in every State of the Union, systems of manual training and nature culture, which should send out, in such way as to reach the children of every school district, some plan of instruction kindred to examples to which reference is here made; plans of instruction which shall meet and answer the longing inquiries of the millions of country school children in the land, whose brain forces are being so sadly wasted for the want of the aid of well taught-instructors. "Blessed are they which do hunger and thirst after righteousness, for they shall be filled." Will not now the convention of agricultural college representatives say of the hungering and thirsting minds of these country children, open as they are to be filled and expanded in true intellectual and moral development, "They shall be filled through the aid of properly trained instructors sent out from our institutions."

The agricultural college course now so well matured, it would seem, would most naturally suggest improved courses of instruction for the country district schools; taking up kindergarten, manual training, and analogous methods, and adapting them to instruction in all grades, from the lowest to the highest, including with such methods drawing, field platting and measurements, pencil sketching of natural objects, the physics and manipulation of farm and domestic machinery and of modern appliances, and something of kitchen chemistry, window gardening, and household art and economy. Why should not a landscape, vegetable and fruit garden, pertain to the district school grounds as well as to the agricultural college grounds? Then the new method carried into the district school would easily and most naturally be made to diversify school studies with instructions and exercises in plant propagation by seeds, slips, grafting, budding, and by many manual educating operations which would naturally suggest themselves to the minds which have become enlisted in this better scheme of education. Exercises in such manual occupations, while possessing interest in themselves, would cultivate observation and exercise thought, and at the same time would give dexterity to the hand and lay no little of a foundation of knowledge and experience in the direction of qualifying the pupils for the employments which they are to engage in upon the farm, in the garden, orchard, nursery, dairy, and in the household.

The agricultural college normal graduate, educated for this work, would be qualified for a county normal institute instructor, and to fill the office of county superintendent. And, still better, he would be qualified to co-operate with the county superintendent as special instructor, to visit the school districts, to instruct and stimulate the pupils, to aid and direct the teachers, and with maps, charts, and apparatus, to give instruction to all classes; to the pupils and teachers in the schools and to the people in their clubs, granges, societies, and popular gatherings.

Says Hon. John Eaton, Commissioner of Education:

"At present the country school is too often an isolated, neglected object, and the teacher is depressed by the indifference of the rich and fortunate, and the suspicions of the poor. Make the school an object of local pride and respect, and all this will be changed. What a city teacher derives from association with numbers engaged in the same business the country teacher will gain from the lively interest of the community in which he is placed."

Estimates of the cost of apparatus and appliances attending this scheme of education compared with the cost of the useless school-books which would be thrown out by it, cannot here be presented. But it is believed no increased expense in dollars and cents would be caused by the change.

## FURTHER TESTIMONY.

In response to a request made for an opinion as to the feasibility and propriety of making our country district schools in some measure schools of agriculture, horticulture, and household economy, President Andrew D. White, of Cornell University, last November, wrote:

"I agree with you substantially throughout. I believe that for ages, altogether too much time has been wasted by bad methods in common schools, and, indeed, in our educational institutions of all grades. My conviction is very strong that if in our primary and intermediate public schools half a day could be taken to book-work and half a day either to technical work or to cultivating the powers of observation in the fields, under capable guidance, all directly concerned—to say nothing of the State and country—would gain largely. I agree as to what you say regarding instruction by use, under the impulse of thought rather than by memorizing technical grammar; and, you might have added that technical grammar comes generally far too early in instruction. So, too, in regard to memorizing rules and theorems in arithmetic; far better to do what in the old schools was called ciphering."

"And now as to the request in your letter for my views on the feasibility and propriety of making our common district schools in some sense schools of agriculture, horticulture, and household economy. As above stated, everything depends on your teacher, and it will be very difficult to get in the smaller schools a teacher who can really do the work required. To some extent I think that in the afternoon there might be simple instruction in agricultural and horticultural processes, as well as in household matters; but in the two former I think the greatest stress should be laid upon the whys and wherefores: that is, upon the teaching the young minds to inquire and to observe. When once this is done the battle is more than half won. Visiting farms and gardens with the pupils would certainly serve a useful purpose if the children are under the guidance of a wide-awake, active-minded teacher. Whether processes could be taught to any extent is another matter."

Prof. H. H. Straight, formerly of the Oswego (New York) Normal Training School:

"I know of no educational movement potentially possessing more power for good than yours, representing as it does the parents of a great State organized, and in a quiet, practical, scientific manner investigating the problem of what kind of education is best for their children. I am in the fullest sympathy in all you say about the superficiality, defectiveness, narrowness of the ordinary school work and the great need of a careful and thorough revision of our school studies. Upon your general conception I have been working in a quiet way for at least the last twelve years.

"The general idea of the scheme is as follows: The child is born into the world—the senses open to the world—impressions infinite in variety and number find their way into its little brain. Before the child is three years old it has made definite beginnings along all the lines of human research, and that, too, by the experimental method. Now, the school, in connection with the home, should arrange the surroundings of the child so that he can continue his investigation in a conscious and systematic manner, giving him opportunity to discover, invent, make—making reading, writing, arithmetic, &c., fall into line as aids in exploring the fields already entered, instead of allowing them to fill the consciousness with their mere symbols.

"The relation of this conception to your scheme is as follows: The elements of agriculture and horticulture and household economy embrace the most interesting portions of nearly all the sciences and arts, while the treatment of these subjects from the historical standpoint would give a most interesting portion of human history, and the study of the literature based upon themes chosen from these fields would give a view of literature in its more technical sense, by no means of slight value.

"Lessons in these directions should begin as soon as the child enters school, and continue until he leaves it, and the so-called three "Rs" should be built into and around them.

"This would make something more than dry bones of these staple studies, and would make the lessons in science and history sufficiently continuous and prolonged to admit of the formation of habits of study and the growth of ideas. In this direction, it seems to me, lies our hope."

President H. H. Dinwiddie, State Agricultural and Mechanical College of Texas:

"That report expresses my views on the subject of technical instruction in the common schools exactly, and I indorse it most heartily."

President George T. Fairchild, Kansas State Agricultural College:

"I have always read your reports in the State Grange with interest, and believe most of your facts well established. I have no doubt that much may be done toward teaching observation of nature and ready judgment in common things by teachers efficient in such training and filled with wisdom for such teaching. Many important facts in horticulture and agriculture can be brought into the country schools for the encouragement of thought and work together, and teachers of experience and judgment can impress much of such truth upon pupils indirectly through reading lessons, elementary lessons in botany, zoology, &c. But most of our schools must have greater continuity and stronger teachers before even such first steps can be effectual."

President Kemp P. Battle, University of North Carolina:

"The kind of training sketched will make our young farmers more fond of their calling, more self-respectful, less disposed to concede superior dignity to the professions of law, medicine, &c. It would stop the tendency to crowd into the cities, and would make farming what it ought to be—generally attractive to the refined and the cultured. Habits of attention, observation, and experiment being formed, improvement in agriculture would be hastened, and the resources of the State discovered and utilized."

President Francis A. Walker, of the Massachusetts Institute of Technology:

"I entertain no doubt that the common schools of the land require very extensive modifications to fit them to satisfy the most urgent needs of the people, and that household economy and some of the domestic arts, industrial economy and some of the mechanical arts, and, in rural districts, agricultural economy, if not some of the arts connected with agriculture, should be made the subject of study and practice from the most elementary stage of education upwards." He would place before pupils rewards "for such qualities as correctness of perception, soundness of judgment, taste in design, ingenuity in overcoming difficulties, deftness of manipulation, neatness of wrought or written work," rather than "for success in memorizing and rehearsing vast volumes of names and dates and sums and facts, a morbid precocity in mastering and applying artificial systems of grammatical and philosophical analysis, and for glibness of speech and loudness of declamation."

President B. F. Koons, Storr's Agricultural School, Connecticut:

"It has seemed to me that much good could come out of the system of instruction you speak of in our common schools. Certainly, the system is one much to be desired, but the great difficulty I see in the way here is in the lack of competent teachers."

President S. D. Lee, of the Agricultural College of Mississippi:

"I approve of the plan proposed, of introducing some studies in agriculture, horticulture, stock-raising, physiology, &c., into the common schools."

Miss Juliet Corson, of the New York School of Cookery:

"In reference to the introduction of practical instruction in household economy in your district schools, as the result of my own experience, I can say that it is not only desirable but feasible."

Prof. Robert B. Warder, of Purdue University, La Fayette, Indiana:

"If qualified teachers can be secured very much may be done to introduce the children of all ages to the forms of useful plants and weeds, the distinctions between such varieties as may be most popular in the vicinity; the points of the best live-stock; the habits of birds and insects; the character of the soils, the marks of deterioration in fertility (if you have reached such a point); the effects of extremes of heat, cold, drought, and rains, upon various plants; the character of soils and of plants best adapted to meet such extremes; the progress of barometric and temperature waves across our plains, and a thousand other matters of scientific and practical interest.

"Practical instruction in sewing and cooking is of the greatest real value for girls of any station in life. Cooking would probably require too costly an outfit, and too much material to be taught in public schools, but sewing is taught in some eastern schools, and the experiment should be watched and studied. I most firmly believe that a fair acquaintance with their nearest neighbors (*i. e.*, the soil, sky, plants, animals, insects, &c.) is of far more importance to farmers and their wives than all the rules of grammar."

President W. H. Scott, Ohio State University:

"I am of the opinion that our district schools not only can be, but ought to be, made, to some extent, schools of agriculture, horticulture, and household economy."

## THE RICE AND SILK CULTURE, AND AGRICULTURAL EDUCATION IN JAPAN.

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Japanese farming may properly be called "gardening," or rather be called "spade husbandry," on account of the methods employed. With a few exceptional cases, the reasons why they employ manual labor is simply in order to keep the land in the finest condition possible. Allow me to state that the entire population of Japan is, according to the last census, 37,017,300. Of this number about two-thirds are devoted to agricultural pursuits, and the entire arable land of the Empire amounts to 11,215,000 acres, which are thoroughly cultivated, and from which the whole vast population is fed. From so small an area of arable land compared with the large farming population, it will be readily seen that there could not be gathered sufficient crops unless the most careful and perfect system of cultivation was followed. It is reasonable to suppose that where a population is excessive and the rate of labor is cheap, saving of time is not thought to be of much importance. The sole object of our farmers is to get the largest amount of money they can from the limited area. This example could not be followed in this country, and it is doubtful whether it is profitable for them, but by means of careful cultivation and the consequent large yields from small area, they are more successful than others. We have no crop sown broadcast, all crops being planted in drills or hills. This makes it possible for us to sow another crop between the rows of crop previously planted and to hoe between the rows, so that when one crop is cut another crop is growing or maturing, and there is a scarcity of fallow land to be found. It is thus possible to raise two or three crops successively on the same land in a single year.

The word agriculture has a very wide meaning, and therefore I beg your indulgence for a few minutes while I say a few words about the rice and silk-culture, and agricultural education in Japan, because rice and silk-culture are the old and leading branches of our agriculture, and now they are developing in this country. Agricultural education is the purpose for which this convention has been called.

Rice is grown in two different ways, one by the irrigation system, and the other is similar to that of wheat and barley on dry land. The former produces naturally a crop superior in quality and quantity, and this is one of the leading features of the farms all over the Empire, for about 6,577,830 acres out of 11,216,802 acres are paddy or rice land which requires to be irrigated regularly, and it is frequently the case that water is delivered from a stream 20 to 30 miles distant. (It is grown in Japan on the same degree to some parts of Iowa, Nebraska.) The seed should be steeped in pond or tank of water previously for two or three weeks, and is sown in nursery beds of paddy land which has been previously well prepared and manured late in the spring, and transplanted afterwards. The preparation of the rice field is the same as that of a nursery bed; the paddy land is plowed up, and after water has been drawn in for some days, it is harrowed repeatedly to reduce the muddy clods into a loosened state, and farm-yard compost with green manure is trodden in or some green substance of a tender nature should be applied. This green manure is specially good for paddy land in order to keep the land in loosened state, and the carbonic acid gas evolved during the decomposition of the green substance is very effective on the soil, and manures excluded from air penetrating. The young plants, about 6 to 7 inches in height, are transplanted into the field, making rows from 8 inches to 1 foot apart both ways, and setting five or six plants together; during a few days after transplanting water is not allowed, but after that time it is regularly let in every evening and let out again every morning, so as to keep the remaining water as hot as possible in the day-time. Weeding of the crop is done three or four times during the growth of the crop, by stirring the mud with the hands and pushing the weeds into the ground; and about a week previous to harvest the field is entirely dried up. Some botanists consider the upland rice (*Oryza montana*) as a quite different variety from the paddy-land rice (*Oryza sativa*), but the latter can be converted into the former, and according to our experience the varieties with a narrower leaf are easier to be so converted. In the Southern States of this country rice is sown directly on the field, but if the planters who lack, from a scarcity of laborers on their large plantations, would provide a nursery bed, they would find time of over two months more for preparation of land than the present system.

## SILK-CULTURE.

The first paper which had been read in the convention was a note from Miss Cleveland, the sister of His Excellency the President, and the subject was silk-culture in the United States—an important bearing upon the subject of woman's industries in this country. I have the great honor to follow up her remarks with a few words on the same subject. Please allow me, gentlemen, to say that there is no difference between the Occidental and Oriental women who stand at the head of society. A desire to explain the reason of this has induced me to speak a little of the history of silk-culture in Japan. The origin of silk-culture is too ancient to be satisfactorily fixed. History tells us that the silk-worm is indigenous in Japan, and was reared by our ancestors, so that we frequently met with the words "kaigo" and "kuwa." The occurrences of the words kaigo (insects to be fed) and kuwa (leaves to be fed upon) show, evidently, that the silk-worm was known to be fed on mulberry leaves; yet it is rather difficult to trace it beyond the reign of the Emperor Ō-zin in 295 A. D., when he ordered one hundred and twenty-seven families of Corean immigrants to be settled equally distributed over the country, so as to devote themselves to silk-culture and silk-weaving. Since this time, emperors and empresses successively encouraged this industry; for instance, the emperor Yu-Ryaku (457 A. D.) ordered all women connected with the imperial household to attend to silk culture, and so the empress herself took charge of it. Our old constitution, created in 570 by the Emperor Sui-ko, speaks in article 17 of the encouragement of silk-culture, and about the seventh century government ordered the farmers to plant mulberry trees, so many according to the nature of the soil, and fixed the different rate of taxes upon products of the silk industry. So it seems at this period that our silk culture was already developed pretty well, continuing to recent times, but as the demand for silk fabrics was limited, it was not so developed as it is at the present, when exportation stimulates the production greatly. In each of forty-six local governments of Japan there are one or two establishments for woman's industry, including silk industry as one of the branches, and owing to the encouragement of our Government there are some hundred associations for silk-culture. About ten years ago our Government established an experimental station for silk.culture which afterwards was transferred to the Imperial garden, and the present Empress inviting noble ladies attends upon it, of which I was reminded by the note received from Miss Cleveland. Without entering into a description of different modes of feeding, I wish to say a few words about the varieties or species. In practice we speak of spring, summer, and autumn insects, but some can be fed three times in a year, although there is a great discussion about the two last named.

Again, we speak of white and yellow cocoon, which are quite different species. The former is the best in quality and in length of fiber, but yellow cocoon is more easily cultivated than the white. Perceiving from your cocoons at New Orleans Exposition from different States that the majority were yellow cocoons, I would recommend you to cultivate rather the white cocoon as more profitable. The following data shows this to be the fact. At the experimental station above mentioned there were selected 21 white cocoons and 35 yellow cocoons as the best sample of common cocoon, among which 6 white cocoons gave 1,600–1,850 shaks (a shak is shorter ⅛ inch than an English foot) or nearly a foot of reeled silk and two yellow cocoons gave of 1,600–1,646 shaks of reeled silk. At the examination of cocoons at the national industrial exhibition at Tokio, eleven awards were given to white cocoons which gave from 2,178–2,827.3 shaks of reeled silk and four awards were given to yellow cocoons which gave from 2,055–2,408 shaks of reeled silk. At a late silk industrial exhibition there were 207 of white and 260 of yellow entered for competition, and the result was as follows:

| | White. | Yellow. |
|---|---|---|
| Total | 207 | 260 |
| Total awards | 97 | 42 |
| First class | 5 | .......... |
| Second class | 24 | 2 |
| Third class | 21 | 13 |
| Fourth class | 47 | 26 |
| None | 107 | 183 |

Among the white cocoons, a species of akabiki is the best, from which we got a cocoon giving 3,005 shaks of reeled silk; it is the greatest length we have ever known.

## AGRICULTURAL EDUCATION.

Japanese farmers were practically well educated by their ancestors, who cultivated only a few acres, sometimes with particular system on particular condition; but this is not of benefit to us who scientifically consider and wish to introduce new and improved methods, because they cling to their old methods, believing them to be the best in the world, and that they are sure to raise good crops. Many say that our farmers are self-conceited or, prejudiced, but there is a reason that they are succeeding the best methods which were invented by their ancestors who never failed for hundreds or thousands of years, and what we are going to advise for them are quite new things which they have never tried, and they are afraid of a failure unfortunately resulting.

There were scientific writers on agriculture in Japan as early as two hundred years ago, but the present system of agricultural education introduced into Japan from the West is twelve years old. There are now two imperial colleges of agriculture, one at Sapporo, on the island of Yezo, which was established under the superintendence of Gen. Horace Capron (formerly Commissioner of Agriculture at Washington), assisted by several American professors. The course of study is similar to that of the agricultural colleges in this country. The other is at Komaba, in Tokio, which was organized under English professors, whose places have since been taken by professors from Germany. It is with this college that I am connected. Besides these there are about ten other public schools of agriculture in different parts of the empire, the professors in which are all graduates of our college. The course of study is as follows: After two years' study of the Japanese and English, Latin grammar, mathematics, botany, zoology, physics, political economy, inorganic and organic chemistry, drawing, forming the preparatory course, the student then enters one of the special courses. These are divided into three departments, namely: Agriculture, agricultural chemistry, and veterinary surgery, which continue three years each. In the agricultural course is comprized agriculture, horticulture, mechanics, quantitative analysis, land surveying, entomology, microscopy, the outline of veterinary science, book-keeping, and practical farm work and gardening. The two other courses, viz., the course of agricultural chemistry and the course of veterinary surgery, are exclusively devoted to the thorough study of those sciences respectively, and a good amount of practical work is done in each by the students in the laboratory and in the hospital and dissecting room.

The practical work of agriculture is learned as much as possible. As the condition of our farmers is above mentioned, it is necessary that the students shall have full knowledge on practical farming, but there are many difficulties which I regret. The practical work of agriculture must be learned mostly in the field, and the work must be done when and where the season or the occasion requires it to be done, which renders it sometimes difficult to arrange before hand the work at any regularly specified time ; thus reaping must be done in the harvest season, and if the student should neglect to devote his attention to it at this time he will be obliged to wait a whole year for another opportunity. Each student is required to spend three hours on an average every day in work in the field, and they work honestly, understanding that unless they become, while students, thoroughly competent to perform farming operations they need not expect to be employed in any work afterwards, and their opinions and advice will not be listened to by farmers. At times it is found necessary to keep the student at work in the field not merely for three hours in the afternoon but the whole day, and this is one of the difficulties attending field-work during the college course, as it interferes with their attendance upon the lectures. Again, some kinds of work must be attended to at fixed times, and some require the students occasionally to work at night, as in the case of certain experiments or of the giving feed or breeding live stock or the feeding of silkworms, and this is another one of the difficulties met with in the practical study of agriculture. Again, the vacation, which occurs in summer time, is unfortunate ; this being one of the busiest season for farmers ; hay is to be harvested, and the crops must be hoed as frequently as possible, all plants grow rapidly, cattle in the pastures must be attended to, but the students have dispersed to their homes and when they return they often find that the crops they were working at have ceased growing or are overgrown with weeds, or experiment has failed. Again, it is important that the student should take up different kinds of work in their proper order, and that the work should be such as he will find practically useful to him hereafter and that his time should not be taken up every day with hoeing or weeding, to the exclusion of more important farming operations, but frequent cases come against our expectations. Next, as to the management of the farm. Books should be regularly kept by the students, in which should be entered every day all the orders given or affairs occurring, so as to train the students to be able to manage practically a farm systematically as well as economically. It is to be regretted, however, that it seems almost impossible to train students in college or experimental farms in such degree, although this is one of the greatest importance in view of the many important things which must be attended to in their time and place.

On all these points I beg the favor of your kind suggestions from the sister colleges in the United States of America.

## SKETCH OF THE WORK OF THE SIGNAL SERVICE BUREAU FOR THE AGRICULTURIST.

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The preparation of an essay on the subject of meteorology, as it affects agriculture, which, I understand, was asked of me by this honorable convention, is a task that would require time and research to properly perform. A moment's reflection will suffice to show that unless a person came prepared to do so, the presenting of such a paper, worthy of this assembly and occasion, would be an impossibility. The preparation would have required months, even years, instead of days.

Those who wish profound views on the subject, strengthened by the results of years of observation and experiment, enriched by the copious light of the philosophic mind of the writer, will find the papers of Professor Henry, published from 1855 to 1859, inclusive, a fountain whence they can draw both propositions and ideas based on facts worthy the age in which we live.

The publication of Mr. J. Lawrence Smith, of Louisville, Ky., on meteorology and the cotton crop is said to be a valuable contribution to this class of literature.

Blodget, on the Climatology of the United States (1857), and the additional matter of later date published by the Smithsonian Institution, the Agricultural and other Government departments, will be found replete with valuable thoughts and suggestions. Of foreign works on this subject the text-book on Climatology of Lorenz and Roth, which deals particularly with agricultural questions, ranks among the first. To these sources, among many others, the student of meteorology in its effects on agriculture may turn for information.

While, therefore, an essay such as requested cannot be furnished, it has been thought that a statement of what the Signal Service Bureau has been and is doing for agriculturists might not be without interest to the members of this convention.

The meteorological division of this bureau was established in 1870, pursuant to joint resolutions of Congress, approved February 9, of that year. The act provided for the giving of warnings to stations on the lakes and the sea-board of the approach and force of storms. The meteorological division, in the first instance therefore, could be considered as organized only for the benefit, directly, of commerce.

On November 1, 1870, the first weather bulletin was published.

By act approved June 10, 1872, the Signal Service was charged with the duty of providing such stations, signals, and reports, as might be found necessary for extending its research in the interest of agriculture.

In executing this law it was found at first that the means of reaching the interior were meager and precarious

The proposed methods of communication with the stations were new to the telegraph companies; but obstacles were gradually removed, so that in fact, as well as by act of Congress, the Signal Service Bureau, after June 10, 1872, commenced to devote a large part of its energies to serving the agricultural community.

A Weekly Chronicle of meteorological facts and data was commenced August 29 of this year. Its object was to give a general summary of the meteorological conditions of the country, for comparison with agricultural and other statistics, and generally to furnish information to those who wished to profit by the labors of the bureau working with its new and increased facilities.

Almost simultaneously with the publication of the Weekly Chronicle was sent out to the farming communities the Farmer's Bulletin, intended expressly to serve the interest of agriculturists.

Subsequently the Weekly Weather Chronicle was discontinued and was succeeded by the Monthly Weather Review, which is still the standard periodical published by the bureau. Originally this was intended to present a general view of meteorological facts, particularly those showing the progress of storms, but in 1874 the scope of the Review was very greatly increased by the transfer to the Signal Service of over five hundred volunteer observers who had hitherto been reporting to the Smithsonian Institution, and of over one hundred Army post surgeons who had been reporting to the Surgeon-General. The amount of data thereby accumulated, particularly that which is of interest to the intelligent agriculturist, is very great, and is all concisely summarized.

The periodical is filled to a great extent with an immense mass of minute details on such subjects as the flowering and ripening of plants and grains, with facts attending the appearance of frosts, rains, floods, tornadoes, &c., within the scope of the field of observation, which, in 1874, due to the causes above mentioned, covered well that part of the United States east of the Rocky Mountains, and, though with fewer stations, the territory west of that range. All atmospheric phenomena, whether taken cognizance of by the instruments or the senses of the observers, are faithfully collected, summarized, and sent out from the office to those whose interests such information could serve. Prominent among those who have drawn on this store-house of meteorological knowledge have been agriculturists and agricultural institutions.

While listening to the interesting papers read before this convention, and the no less interesting discussions arising thereon, the thought has often come up how much satisfaction gentlemen engaging therein—professors, farmers, investigators—would derive from perusing, as they appear month after month, the facts set forth in that Review.

Nor is it intended for the learned and scientific alone. The results of investigations and observations are presented in graphic weather-charts within the easy comprehension of the unscientific portion of the community.

This periodical is in fact so well adapted to the wants of those interested in meteorology, both in subject-matter and style, that it has served as a model which several nations of Continental Europe have copied for similar publications. The condensed form in which tri-daily indications and the special bulletins are issued is a circumstance greatly to be regretted, but at present it is a necessity in order that it may be possible to disseminate them.

This distribution is done by telegraph, and whether paid for by the United States or by the associated presses, calls for the most economical use of words consistent with a clear expression of ideas.

The records of the Bureau show that agriculturists to an equal degree with any other class of the community desire and are furnished with the tri-daily indications and special bulletins. To meet the needs, particularly of the agriculturist, the Bureau has since 1872 published the Farmers' Bulletin, before alluded to; the name indicating precisely the object for which it is issued. It contains the indications of the weather for the district in which the station is located. These indications are telegraphed from the Washington, D. C., office at 1 a. m., and foretell the weather for the next succeeding twenty-four and forty-eight hours, reaching the rural population, for whose behests they are intended, from twelve to forty-eight hours before the time they cover expires.

Accompanying these indications for the district is a bulletin giving all facts of importance connected with the conditions of the atmosphere over the whole country taken as one mass, and viewed at one and the same instant of time in all the parts thereof. The general laws accompanying weather changes in the United States are given in the Farmers' Bulletin in clear yet simple language. Still further the direction of winds, that observations have characterized as wet or dry, for that particular geographical district is therein set forth. In fact, there is compressed into this small sheet a great deal of meteorological information that is of interest and service to every thinking, intelligent agriculturist before whom it is placed.

It will not be forgotten that the reports to make up the information thus given out to the farmer come from Sydney, in Cape Breton Island; Roseburg, in Washington Territory; San Diego, Cal., and Havana, Cuba, as well as from one hundred and fifty intermediate stations. This area is 3,000 miles long and 2,000 miles wide. By the telegraphic system of the Bureau, observations, first placed in cipher to condense them into the smallest number of words, commence within fifteen minutes of the time they are taken to converge by various paths on the central office in Washington. When the wires work well an hour sees the last report in; and this time may be shortened or lengthened, depending on the telegraphic service. They are translated fast as received at the central office; the mass of data, systematically arranged, is placed before an assistant to the Chief Signal Officer whose duty it is to deduce therefrom forecasts of the weather. This duty is completed at about 12.45 a. m. Then commences the dissemination of the indications and special bulletins to the principal cities and rural printing stations, where, between 3 and 4 a. m. the Farmers' Bulletin is found printed, addressed, and at the post-office ready for distribution.

As a means of diffusing general knowledge on meteorological subjects among thinking agriculturists who cannot profit by the Farmers' Bulletin, because of the isolation of the farm or for other reasons, the publications of the Bureau are placed within easy reach of all who desire them, for a sum in each instance equal to the cost price to the Government of the material with which they are printed. The work of watching, recording, and giving timely warnings by wire of the rise and fall of rivers was early in its history undertaken by the Signal Service. Stations were established, with gauges to mark the fluctuations of the waters, on the Savannah, Tennessee, Ohio, Mississippi, Missouri, Columbia, Willamette, the Sacramento, in truth on nearly every river of the United States the valleys of which embrace interests, agricultural or otherwise, influenced by the rise or fall of their waters. In case of extraordinary floods the river observers are authorized to telegraph information to those interested lower down the stream without first referring the information to the central office. On the Pacific coast this is always done.

By this system of river reports timely premonitions of the great freshets that annually visit the Mississippi Valley, with the changes of the waters of that river, can be given, and thus in a measure its levee system be protected with the immense agricultural interests dependent thereon.

As with the Mississippi so with the valleys of the other rivers, each with its agricultural, commercial, and manufacturing interests more or less extensive. For some years attempts were made to furnish the people of Texas warnings of the approach of northers, which, if their effects are not anticipated, sweep with such disastrous consequences over that and the country adjacent thereto on the north. During last summer a cordon of reporting stations was completed on the north and west sides of a portion of the territory visited by these storms, and a systematic plan for giving notice of their approach was inaugurated for the benefit of Southern Nebraska, Kansas, the Indian Territory, and Texas. The plan for carrying out this scheme consists in sending notifications of the approach of northers to certain telegraphic centers on the railroads traversing those districts. From these telegraphic centers the railroads order the notifications to be distributed to the stations on their respective lines.

Notifications similar to those sent to the railroad centers are also furnished the officer in charge of the military telegraph lines at San Antonio, Tex., and by him sent to all stations under his control.

As these warnings can generally arrive from twelve to twenty-four hours before the onset of the storms, agriculturists, ranchmen, and others, who are situated so as to receive notification thereof, are enabled, in a greater or less degree, to provide against their effects.

This system of warnings is very popular with those whose interests it is intended to serve. It will be extended in scope as facilities for doing so are made possible with the Signal Service.

In 1877 the Bureau was invited to co-operate with the United States Entomological Commission in collecting and summarizing all obtainable data relating to the origin, habits, the flight, and devastations of the grasshoppers or locusts which blight the face of the country in some western sections, as is related of the plagues in Egypt. All stations of the Signal Service west of 93° meridian and east of the Rocky Mountains were directed from March to November to report "the date of appearance of the locusts, the direction from which they came, the direction and velocity of the wind, and state of the weather at the time of observations, &c.," and generally all information which, when systematically arranged and studied, will aid the entomologist to foretell with more or less certainty the undue and periodical return of noxious insects and particularly the western locusts. It is now one of the regular duties of observers of the service in the territory afflicted by this scourge to make report of all facts connected with these insects with which they may become cognizant. Much of the data given to the public in the report of the Entomological Commission was furnished by the observers of the Signal Service, and an important contribution to the subject of the hatching of locusts' eggs, based on our observations of temperature, has been made by one of the assistants to the Chief Signal Officer. During the summer just past, every preparation was made through the regular and many volunteer observers to have reports furnished the officer of the movements of grasshoppers and locusts, but it is agreeable to report that in no instance has any mention of damage been made, although the insects made their appearance at a number of stations of observation. Probably, in future years, opportunity will offer to practically apply the system of prediction of flights of grasshoppers that has already been matured.

In 1879 a system of frost warnings for the benefit of the sugar industries of Louisiana was commenced. It consists in transmitting from the Washington office to the sergeant at New Orleans notifications of such cold waves as will probably extend over the sugar-cane sections, carrying with them reductions of temperatures sufficient to cause killing frosts. The sergeant spreads the information both through the press and by telegraph to those interested in this branch of agriculture. A service similar in all respects to this, but for the benefit of the orange growers of Florida, was initiated this past winter. Notifications of anticipated frosts are sent to the sergeant at Jacksonville, he, when directed so to do, telegraphing the warnings to Sanford, in that State. From each of these places as centers is news distributed by all available means to those interested in orange growing. The warnings as a rule arrive from thirty-six to forty-eight hours in advance of the cold wave.

During 1881 a system of reports of considerable magnitude was instituted for the benefit of cotton interests in the South. Ninety-five stations furnished readings of maximum and minimum thermometers, and of rain gauges. The stations of observation were distributed pretty evenly over the cotton belt, at least as much so as was practicable. The railroad and telegraph agents, with the consent of their employers, acted as observers. The cotton belt was divided into thirteen districts, each with its center for the collecting of reports; these centers being located at cities where were regular Signal Service observers. This precaution was necessary because of the duty devolving on the centers of consolidating and disseminating reports. The thirteen districts were formed into three divisions, each with its center, to still further facilitate operations.

Observations were taken at 6 p. m., local time, put into cipher, and transmitted to the center of the geographical district in which the station was located. Here a mean of the maximum, a mean of the minimum temperature, and a mean of the rainfall for the district is made up and sent to the main centers of the respective divisions. The main centers, Atlanta, New Orleans, and Memphis, interchange reports, and then distribute them to the centers of districts. By this interchange of reports, all the prominent cities of the South are supplied with information daily as to the temperature and rainfall in the cotton belt. Published in newspapers, bulletined at cotton exchanges, and other prominent places where business men assemble, this data comes quickly under the eye of thinking, interested men of the community at these centers or within the scope of their daily newspaper circulation. The same information gathered and consolidated for longer periods of time—for a week, month, a year, or several years—could convey, through the columns of weekly papers, monthly periodicals and statistical tables, useful knowledge to the farmer as to the temperature and rainfall that belongs to his or any other district of the cotton belt, or of the Belt viewed as a whole.

It is proposed to begin the service again this year, commencing April 1, 1882, and extending to October 31, 1882, with one hundred and forty reporting stations. At the solicitation of wheat and other grain growers in the Northwest, the Chief Signal Officer has it in contemplation to institute a service similar in idea and perhaps quite like this in detail, and in the interest of the grain growers of that section. When it will be put in execution is at this time undetermined. Such schemes cannot be inaugurated in a day or week and operated successfully, but any delays that occur in the carrying out of this plan will be unavoidable. With a view to rendering the Signal Service more valuable to the agriculturists of the country, regardless of sectional limits, the Chief Signal Officer has proposed to the governors of the several States the organization of State weather service, which will be authorized by State legislation, and co-operate with the Signal Service in the collection of meteorological data.

From this system of reports we will be enabled to determine more fully the minute local peculiarities of climate of each section, and the Agricultural Department will be able to furnish the farmers with information bearing upon the culture of crops in the different sections of the country. In the organization of the State weather services it is proposed to have at least one observer in each county who will report by mail at the close of each month to the chief of the State weather service, and from the reports received a monthly review of the weather will be prepared by the chief of the State weather service. Copies of the review will be furnished to each observer and to each county paper for publication.

The results obtained from the local weather services will be furnished to the Chief Signal Officer of the Army in time to be made use of in the preparation of the monthly weather review of the Signal Service, and will also be accessible to the Commissioner of Agriculture. Local weather services have already been organized in Iowa, Missouri, and Nebraska, and the organizations in the other States are awaiting the action of the State legislatures.

There has existed a difficulty, and it exists now, in conveying warnings of storms or other useful information promptly and quickly to the farmer on his farm, when away from the telegraph line or the post-office where the farmer's bulletin is displayed. There have been a variety of methods proposed by different persons for overcoming this difficulty. One man suggests a signal be displayed on the passing railroad train. Another proposes to erect a very high pole on which to hoist a flag, light, or other signal so farmers within sight of it may take warning. One proposes small balloons and lights. Another proposes to fire off cannon and thus propagate the news as to weather changes, floods, &c. These are only illustrations; there are many other suggestions of a similar nature. The weak point in all these schemes, so far as the Signal Service Bureau is concerned, lies in this, that these persons, being irresponsible, would exercise their volition, hoisting signals or not as suited their convenience or fancy; and if mistakes are made by them the community and the Bureau suffer without means of redress. In the important matter of storm warnings the Bureau must have perfect control; unless this be so the service will be compromised. It is the earnest wish of the Chief Signal Officer that some methods may be devised whereby the service may be rendered more practically useful in preparing the farmer in his home for changes in the weather, so as to put him more nearly on an equality in this respect with those who have the advantage of the telegraphic or telephonic communication.

If the honorable members of this convention can suggest any measures looking to this end, measures whereby the Signal Service Bureau can become more useful to the agriculturists of the country, the Chief Signal officer will be glad to be favored with them. He will give them careful consideration, prompted by the desire to render the service of which he is the head directly useful so far as it is possible to the agricultural interests of the whole country.